

# APOLLO™ ZX

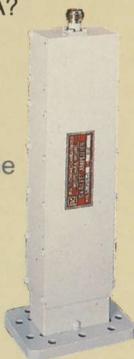
## Satellite TV Systems

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ask these important questions.

**1** Does the system utilize an LNC or an old fashioned LNA?

The new Apollo LNC (low noise converter) eliminates the need for cumbersome 4 GHz cable and moisture-sensitive downconverters. Easier installation, greater reliability, and reduction of moisture problems all make good sense to National Microtech.



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**TOP OF THE MONTH**

**Soul searching.** There is plenty of that in this issue as we attempt to plot what has happened to us during 1982, and project with a degree of accuracy what may happen to us in 1983.

Scrambling seems inevitable. In spite of the terrible problems Oak is having in Canada with Orion, we should not dismiss the scrambling concept with a terse "they will never make it work." **They will.** Perhaps not Oak; but somebody will.

International reception is bound to get new attention in 1983. If the US market stumbles over the scrambling issue, manufacturers and distributors will be searching for new outlets for their products. Offshore could help, but it won't do the 8 foot dish and \$395 stripped down receiver suppliers any good to waste their time trying to market there. If we have learned nothing else during 1982, it is that with few exceptions it still takes big antennas and high grade receivers to play satellite TV in Nigeria or Bolivia.

**Quasi-business systems** look good in 1983. The only problem is nobody in our industry understands the market, the services offered, or the exacting system requirements sometimes required to make the data services play to the satisfaction of a customer. We'll all spend the first six months trying to learn this 'foreign' non-video end of the business, and then if scrambling is hurting our business sales, we'll see an explosion in this area in '83.

**Man of the year.** This year, 'Men' of the year. Our congratulations to AVCOM's **Andy Hatfield** and ADM's **Jamie Gowen**.

**JANUARY 1983**

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**Our Cover —**

AVCOM President Andy Hatfield in a moment of quiet reflection and study. Andy spent several hours carefully measuring satellite transponder service levels from a number of North American domestic birds on a newly installed ADM 20 foot dish during an early November visit to Providenciales. **See page four here.**

**COOP'S  
SATELLITE  
DIGEST**



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## COOP'S SATELLITE COMMENT

- INTERCONNECTING/Europe-North America
- NUMBERS/Who Cares, and Why?
- INTERNATIONAL Trade Association?

### SCRAMBLING PROPHET

In my November 'comments' I passed along a 'rumor' that alleged how all of the major pay or premium service folks were going to get together and use a single scrambling system, in unison, to dirty up their satellite delivery. I allowed as how this approach made excellent sense to me since it would allow all of the participating premium suppliers to share in the costs of the scrambling system. It also makes excellent sense for the cable firms contracting for these feeds since they would all be using the same basic descrambler equipment. I suggested that the hardware might consist of one master 'main frame' with room to plug in several separate cards. Each card would have the circuitry necessary to descramble Showtime, or HBO, or The Movie Channel, and so on. I would expect there to be a slight 'variation' between not the scrambling techniques, but rather the scrambling 'codes' employed by each.

Now we come to the Western Cable Television Show and the announcement by several of the premium folks that they have, indeed, reached an agreement whereby they will be 'sharing' the technology and costs associated with a **common scrambling system**. HBO, it appears, plans to be first up with some real world testing starting sometime before the end of June, apparently on their western (TR13) feed on F3R. The announcements from each of the participants vary, but it sounds as if they will all plan to have their respective systems operational before the end of the fourth quarter of 1983.

Should panic set in for the home TRVO market? Probably not. Certainly **some** existing TVRO owners, and **some** potential home TVRO owners will be unhappy when they learn that their favorite 'free' movies are going to disappear into scrambled oblivion. But if you as a dealer have been honest with your customers, you should have been telling them all along that they have no guaranteed (or other) 'right of access' to premium service programming; and you should also have been telling them that lacking permission to view, they should not tune in those channels. **That's what you should have been doing.**

I will gladly trade perhaps ten (or eight or six) of the premium service channels for the **legal right** to access **all** of the channels that are **not** clearly private. With the HBOs et al going to scrambling, now we have (for the first time) something to back up our requests for help from Congress when we ask that they intervene to get us into the bill paying line at HBO (et al).

From the very beginning of this industry, we have been **trying** to pay HBO and we have been trying to get them to accept us as legitimate customers. And from the very beginning of this industry, HBO they have told us 'No thank you, we don't want your business'. HBO could have avoided all of this scrambling mess if they had gone along with the first formal request from Scientific Atlanta, back in April of 1979, to allow home terminals to view and pay for HBO service.

It is easy to fault HBO for not going along, but I think there is much more to their reluctance than merely the blame they lay on the movie suppliers. For those new to this 'game', HBO has been consistent in telling us that **their** movie supplier contracts do not grant them the right to sell to **individual** viewing terminals; only to community (as in CATV or MDS) 'viewing terminals'. I figure that somebody, probably in engineering, has been advising HBO management that if they held on long enough there **would be** an adequate scrambling system available which would give them 'addressability'. That means they can

dial-up which authorized terminals do, and do not, get their service.

There are two reasons you opt for addressability. One is to forcefully remind those who are late in paying that without payment there is no service. Most cable firms are pretty good about paying their bills, so that is not very valid for the cable industry. The second reason is more spectacular.

If you can '**address**' who gets your service, **and when**, then you can also create a special program (or two or three) which is only seen when viewers agree to make a special payment for that program. That is often called 'Pay Per View' or something similar. Let's say that HBO wanted to **offer all** of its subscribers a special advance showing of a movie, before the movie even got into the theaters. They can't very well get 11,000,000 homes to each **agree** to send in \$4.95 to see that movie; **not voluntarily**. But, if they cut everyone off who didn't phone in and authorize that \$4.95 be tacked onto their next month service bill, on a home by home basis, then they would have something. Addressable scrambling offers that possibility.

If you were HBO, **what would you do?** They average around \$4.25 per home per month as their share of the full month's service. That's \$4.25 spread over 30 or 31 days, 24 hours a day. Now, if you could show just one special event per month and grab an extra \$4.25 (or \$4.95) from say 10% of those 11,000,000 homes, you would be increasing your revenue by 10% for that month. Do that 12 times per year, and you end up with an increase in revenue equivalent to 120% of a normal month. **That's like finding an extra month of income every 365 days!**

So when HBO says they are going to this tremendous expense just to 'protect' their product from illegal (their word, not mine!) home TVRO reception, don't you believe it. What they are doing is executing a long term game plan first conceived perhaps five years back; a game plan to position themselves in the pay-per-view (PPV) business. Not today, not tomorrow; but soon.

They will attempt to make everyone believe that they are going to this tremendous expense to cut off perhaps 80,000 or so private home terminals. If they were really worried about protecting their service from illegal viewers, they would be hot on the case of the cable firms that have such lousy security. I read a report, a good, factual report, recently that suggested to me that in New York City alone there are probably 55,000 'illegal' (as in non-paying) premium service viewers. Translate that to nationwide 'illegal' cable connected viewers and you have a number 7 to 8 times as large as home TVROs. I also read a recent court decision involving a Minneapolis MDS operator in which it was revealed that there may be 25,000 illegal MDS receivers watching premium television in and around Minneapolis. Translate illegal MDS viewing nationwide and you also have a number that dwarfs TVROs today, tomorrow, and for years and years to come.

So let's keep HBO (et al) scrambling in perspective. It is a tool HBO needs to position themselves for the next big quantum leap forward for pay premium, programming. As an aside, they clean up home TVROs. But **we are not the reason** for all of this expense.

Will this move hurt the home TVRO industry? It cannot help us, of course. Not right away, anyhow. But if we all stay behind SPACE, support the SPACE effort to get HBO into a legal position where they can no longer **deny** their satellite programming to willing, paying home TVRO viewers, then we will ultimately come out of this far better than

we are today. It is the only way we can count on our industry staying viable over the years ahead!

#### CONGRESSMAN TAUZIN VISIT

Anytime you can get the undivided attention of an influential US Congressman who has an ongoing interest in communications legislation, it is time well spent. Recently one of the SPACE trade association founding fathers, and current Board Member, Russell Keene brought Congressman Billy Tauzin (D. La) to the island of North Caicos in the Turks and Caicos. Keene and others have invested in a resort hotel on North Caicos so he is no stranger to our islands.

The Congressman, Keene, a bevy of travel and feature magazine writers representing some of the best publications in the USA and a small contingent of Tauzin aides flew over to Providenciales to visit us. Russell wanted Congressman Tauzin to have the opportunity to visit our West Indies Video system, and to perhaps better understand how important satellite technology can be to a basically backward and underdeveloped country such as the Turks and Caicos.

I found Tauzin to be exceedingly bright and better versed on our industry, DBS at 12 GHz, and technical improvements that satellites might one day offer (such as the CBS high definition system now being tested), than the majority of industry people I meet and talk with. It was a joy not to have to patiently explain what a dish is, how the system works, and what can and cannot be done with it. Tauzin showed special interest in 12 GHz, and seemed to understand that the US television system format (525 lines of maximum picture definition) was established back in the 40's. He was very interested in what might be done, with 12 GHz satellites, to offer the public super high quality 1100 plus line video. CBS has proposed this, first as a test, at 12 GHz and the FCC so far has shown very little interest in even allowing such satellite tests. Privately, I have felt that 40 plus years of a 525 line-only standard was long enough, and that if there is a way to improve the system so that we have the kind of superb picture quality which a higher definition system could provide, that we ought to allow CBS (or whoever) the opportunity to spend their own money to determine whether such a system could survive in the marketplace.

Congressman Tauzin and his party just missed by an hour or so live Russian coverage, via Ghorizont, of the Russian 65th anniversary celebration, but they did see some typical East German nightly television that drew at least a few 'oohs' and 'hey look' remarks when a play being televised included a substantially nude view of a young lady. One of the group remarked that he knew, instantly, that he was not watching CBS! The Congressman was quick to notice that the SECAM format color we were watching on our multi-standard JVC monitor 'looked different' than our American (NTSC) system. The SECAM (and PAL) treatment of the pastel colors is far more lifelike than NTSC and apparently it is obvious even to casual viewers. That led the Congressman into a series of questions regarding whether or not a high definition system, operating perhaps in the 12 GHz band, might not also utilize a different color format since there has obviously

been considerable improvement in color transmission technology and techniques since the US system was adopted in 1952.

I like anyone with an open mind. Congressman Tauzin has an open mind, and because he is active on a communications subcommittee which may one day decide just what happens to private TVROs in the legislative arena, I feel that he (and all other Congressmen) needs to have our time and attention, when he can make the time available to us.

If you have the opportunity to 'educate' your own Congressman, you should do so. One way to start is to arrange for him to see a live demonstration, in his home district office, of C-SPAN coverage. If cable in your town does not carry C-SPAN, or there is some other reason why the home district office does not have C-SPAN available, there is a real opportunity here to introduce your representative to the wonders and benefits of satellite delivery to private terminals.

#### ADDRESS-ABILITY

We are all going to hear a great deal more about 'addressable' technology in the next few years. And it is important that you understand just what addressing means, and why it appears to be the wave of the future for virtually all of the satellite delivered special or premium type services. That includes audio as well as video.

Normally, addressability works in conjunction with some form of signal scrambling. But the two are not always employed together, nor for the same reasons. The concept behind addressability is that the program or service sender has control over who receives his transmission(s). So far that sounds like scrambling.

The key difference is that with an addressable system in place, the sender can send a coded message to each of the authorized receiving locations and tell them to 'turn on'. ABC, for example, can control which of the affiliates receive 'Happy Days' by simply assigning a digital code or address to each of the affiliates, and then 'ringing up' or 'authorizing' only those cleared for a specific program. If the transmission happens to be also scrambled, as most will be in this class of service, then those affiliates who have descramblers but not authorization to carry a specific program will see a scrambled program; except when their address has been transmitted ahead of the program.

Different interest groups have different reasons to embrace addressability. Broadcast networks feel this will give them a way to handle a 'mix' of broadcast and cable affiliates. Their concept is that ultimately each of the big three networks will be providing, via satellite, perhaps as many as eight different simultaneous network outgoing services in prime time. In Chicago, the program with highest mass appeal will address directly to the local network broadcast affiliate there. The other seven would be addressed, on a program by program basis, to the next generation of (multiple channel) MDS, to the local STV service, a couple perhaps to low power broadcasters and the balance would be offered, and if bought then addressed to, local cable affiliates. With thousands and thousands of potential affiliates, all in different operational formats, the only way a major multiple-program service such as ABC could function in the future is to have the ability to address, program by program, each of the potential affiliates in each of the markets. And simply turning the program selection chore over to 4,000 or 40,000 individual affiliates nationwide is not a suitable answer, they feel. It must be done by the network itself, from a central dispatching point.

The premium service folks, on the other hand, see addressability as the next step in extracting more dollars from the American viewer pocketbook. As noted earlier in this month's comment, when they can sell special programs on a Pay Per View (PPV) basis, then they have something that will generate very big dollars in a hurry. Initially, such addressability will extend just to the cable, MDS affiliates. Ultimately it will extend through the affiliates into the individual homes. And once again, a master control point will address each of the individual authorized receiving points directly.

In the audio field, Panasonic and a number of partners (including PBS) are about to come out with an audio addressable system. In the home, people will have special addressable audio decoder boxes.



CONGRESSMAN TAUZIN and Coop debating the merits of screen mesh dishes.

## 1982 INDUSTRY MEN OF THE YEAR

With our January 1981 issue, **CSD** began a program of selecting, in our own fashion and for what we felt were the best of reasons, a 'Man Of The Year' for the industry. There is no committee making this selection; this is an individual selection by Coop.

The basis for the selection is 'contribution to the industry.' For example, in our first such award **H. Taylor Howard** was named 'TVRO Industry Man Of The Year.' Tay's contributions during 1979 and 1980 were many, of course; including his development of a **basic** TVRO receiver which shortly found its way into dozens of different designer labs. Taylor also served as the first President of SPACE and led us through some very difficult formulative months.

In January of 1982 we named **Dave Fedric**, President of National Microtech, as 'TVRO Industry Man Of The Year.' Fedric's naming puzzled some until they read our three part series where it became clear that Fedric's aggressive approach to establishing a national chain of distributors and dealers had indeed moved the industry into the big-time, and set a pattern which others have followed. Dave Fedric, as well as Horton Townes and John Grantham, the balance of the 'NM' team back in early 1982, had put together an equipment delivery chain which took us into a new level of growth.

This is, of course, our January 1983 issue and it is once again time to name our 'Industry Man Of The Year.' Our thoughts leading up to the selection of a 'Man' of the year begin very early. We would like to share that process with you.

When **Bob Behar** 'opened up' Africa for TVROs in our April issue, proving that a 20 foot dish of modern design could drag in a quantity of signals, we began to think about the contributions Behar was making to the industry. Not everyone was doing things to expand the market like Behar. Later in the year, Behar would push the known limits of US domestic birds deep into South America and as he would report in **CSD**, areas just **south of** the equator in Brazil were receiving useful US domestic signals on a couple of satellites. This fall Behar managed to go as far south in Africa as you can go, into South Africa proper, and we reported on the results of this trip in our December issue. He also managed to get himself elected as the 1983 President of SPACE this fall, and as we write this he and a member of his field engineering staff are in the Phillipines installing the first domestic terminal there. Behar, having opened up Africa, the Middle East (Kuwait, Saudi Arabia), deep South America and the Pacific Ocean to terminals would seem a likely choice.

When **Rick Brown**, Vice President of SPACE took steps to get SPACE moving, and into a mainstream which the majority of the industry could support, he seemed like a logical candidate for the selection. As the year built and Brown and staff were very effective in negotiating the industry out of disastrous pieces of legislation, and then equally effective in getting the industry contractual rights (for SMATV systems) with SelectTV, C-SPAN and others, his position grew stronger.

But both men are, generously, controversial. The controversy surrounding Behar largely stems from the excesses of publicity he has received, first as a 'pioneer' on a worldwide basis, and then as the head man in charge of putting together the first annual SPACE trade show this past August in Omaha, and more recently as the newly



**HERO'S BEHAR** is an effective get-the-job done kind of guy.

selected head of SPACE. Controversy does not rule him out of the running for this 'Man Of The Year Award,' but it does cause us to listen and listen carefully to those who find some of his activities controversial.

The controversy surrounding Brown is more direct. He has stepped on a number of toes in the industry as he has built SPACE into a solid, industry wide organization. Virtually everyone feels he is an effective spokesman for the industry, and an extremely bright attorney. Not everyone gives him as high marks for his handling of some of the SPACE intra-industry affairs.

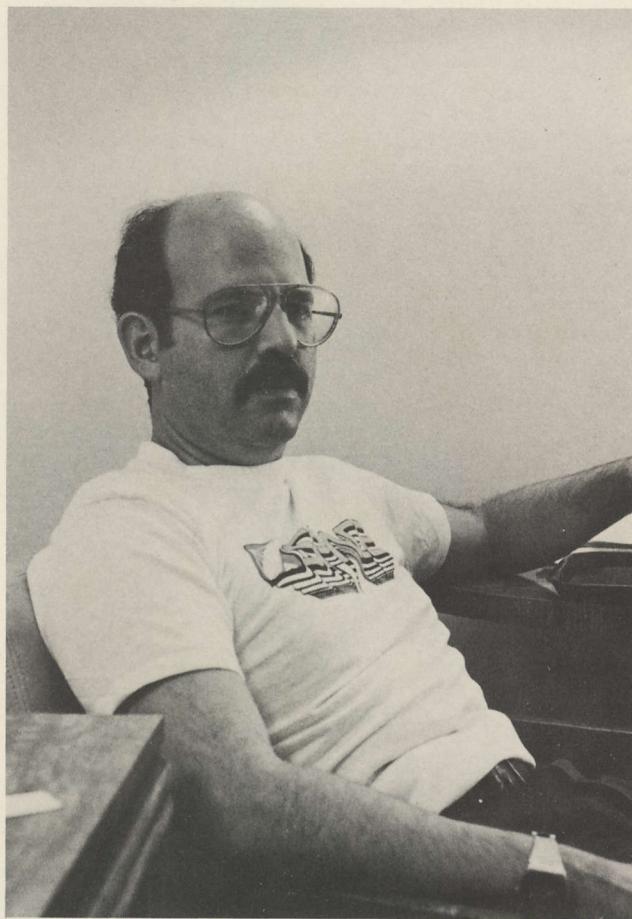
The election of Behar to be the new SPACE President intertwined their futures. While there is a Chairman of the Board for SPACE (Bud Ross of Birdview Satellite Communications, Inc.), the day to day operational direction for SPACE must come from the President. That means that Behar and Brown will be running the SPACE-ship for the coming year. **It is likely to be a controversial year.**

So while each has made a major contribution to the industry during calendar 1982, both also are leaving much unfinished business. We once told Brown "You would be a shoe-in for 'Man Of The Year' if you get all SPACE members, private and commercial, equal access to the controversial 'premium service' channels." We'll stand by that.

Contributions to the industry are often unseen. Or unrecognized; that being the primary reason why we elected back in 1980 to create such an award. Dave Fedric and the National Microtech contribution during 1981, for example, was largely unrecognized for the importance it had in industry growth. The award brought attention to the contributions they made that ultimately benefitted us all, and gave us a new direction of focus.

Contributions are often small as individual incidents but their cumulative effect is substantial. That is the case this year.

**Jamie Gowen** heads up **ADM** (Antenna Development and Manu-



**SPACE'S BROWN** is a serious contender for a future year; he still has to get us out of our legal 'muddle.'

factoring) with headquarters in Poplar Bluff, Missouri. Jamie is one of the nicest people in the industry. He was also 'the pioneer' mass production antenna manufacturer in this industry. The magnitude of his contribution to getting hundreds, if not indeed thousands of others started in this business, as dealers, cannot be measured accurately.

Jamie Gowen first heard of the industry by reading an article describing home terminals back in 1979. Coop wrote it. The article described the then early systems and reported on the then recently completed (summer of 1979) 'first' SPTS event. Gowen was operating a moderate sized welding and fabrication shop in the far southeastern corner of Missouri. He liked television, but the only local reception was a low power UHF channel which acted as a 'slave repeater' for a VHF station in central Illinois. Jamie, like many others, did not have local, dependable, service from even the three basic television networks. He recalls how in the fall of 1979 he had installed a tall tower, a large VHF/UHF antenna, and loaded it down with signal boosters and other home TV products to try to pull in distant VHF service to fill in for the two missing networks. One of his distant VHF channels came from Kentucky, and it operated on VHF channel 6.

"Just down the road was a Missouri Highway Patrol station" Jamie relates. "Everytime they used their radio, my antenna mounted booster would fold up and quit. Their heavy use of their radio always coincided with my sitting down and watching television!" Jamie was ready for satellite TV.

At the same point in time, Andrew Hatfield was fresh off the 'show circuit' having gambled his money and time that he might be able to design his own commercial grade TVRO receiver. Andy began an interest in TVROs in 1978, and for nearly one year he had carefully studied the then available commercial receivers. He was employed fulltime, as he had been for ten years, with a major (IBM) computer

firm and while he liked his 'job', it was indeed a job. At the same time, he had been operating a small company (AVCOM of Virginia) which was manufacturing aircraft radio aides and other small packaged products which appealed to two-way radio system people; including hams. The AVCOM operation was providing him with the opportunity to do things by his own direction, and enough extra cash that he could afford to look into a major project such as designing and manufacturing a home TVRO receiver.

Andy's approach to the first SPTS had been, in typical Hatfield form, 'conservative'. He, his wife Pat (who was teaching school at the time), and a couple of 'advanced proto-type' TVRO receivers journeyed to Oklahoma where AVCOM was one of the eight exhibitors at the first SPTS. Andy worried that he might not sell any product, that his concept of a TVRO receiver might not appeal to the yet-to-be-born industry, and that he was wasting both his time and his money. He did not have to worry. Andrew and Patricia Hatfield left the initial Oklahoma SPTS show with hard orders for more product than they could generously turn out over the next six months or so. In those days, and this was prior to production of any receivers on anything approaching an assembly line basis, a monthly goal of 25 receivers shipped seemed unmanageable.

Gowen and Hatfield became acquainted in the middle of the fall of '79. Gowen, having read of the SPTS event and anxious to learn how he could have a terminal of his own, looked through the article a second time to locate somebody he could call on the telephone and discuss owning a terminal. He found Hatfield's name.

"Jamie was very enthusiastic, but then so was everyone that called in those days" recalls Andy. "I tried to find out what experience he had, since one of the things that we were having trouble with was selling a complex communications system on the telephone, and then trying to tell people how to use that system by remote control. We spent hours everyday, in that era, just getting people from step 'A' to step 'C'. You can't believe how difficult it was to convey to people the simple basics we take for granted today; like aligning a dish".

There was an instant attraction between the two. Anyone who has spent anytime talking with Jamie Gowen will understand why. There is no more cordial, likeable man in the industry today. Even the conservative Hatfield would find Jamie's enthusiasm infectious.

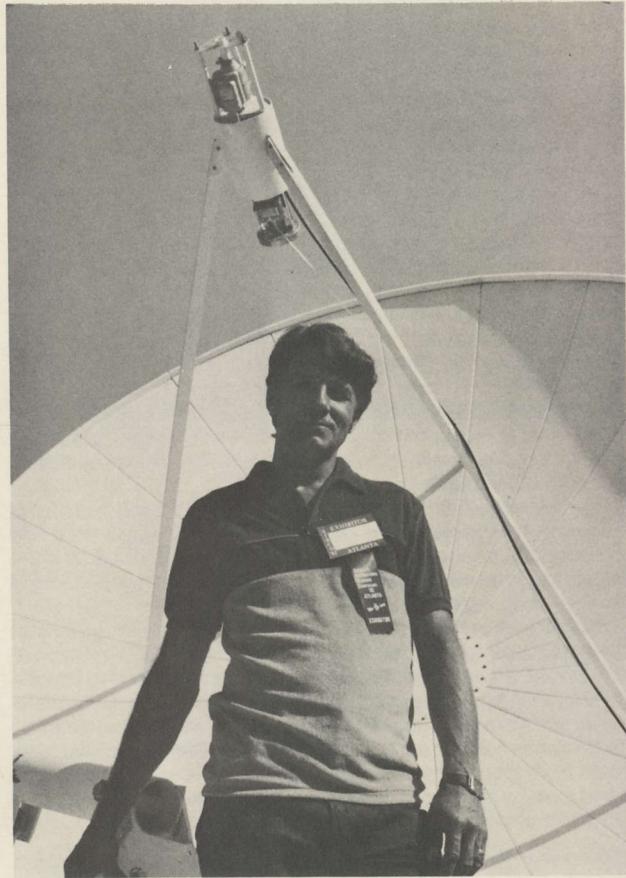
Neither remembers exactly the sequence of the conversation but eventually Hatfield learned that Gowen was in the metal fabrication field. Andy suggested that one of the key parts of a home system which needed somebody with production expertise was the antenna. At that point in time, only Jim Vine's Paraframe was building home antennas and his volume was, well to be generous, very slow.

"I have a new antenna here" Hatfield told Coop one day in the middle of the fall of '79. "It is being built by a fellow in the mid-west and it works very well". AVCOM's Hatfield worked with Jamie Gowen to get him into the antenna business. Jamie was a fast learner, and he obviously knew metal fabrication very well. Hatfield: "It looks like a miniature SA dish". That it did.

This very early ADM 11 foot dish is still in operation at AVCOM. ADM would first appear in the marketplace in the December 1979 issue of 'CSD' with a back cover advertisement that displayed the antenna inside of the factory where it was assembled. "Introducing ADM's Eleven Foot Satellite Antenna" the headline read. Two months later, in Miami, Florida at the second SPTS Jamie Gowen would first demonstrate his antenna to the industry. As a late arrival Gowen ended up in a very undesirable display location. He would never be late to a show again!

From December of 1979 to September of 1982, more than 250,000 metal panels for his 11 foot parabolic antenna would leave the ADM factory. More than 10,000 antennas shipped by truck, car, trailer, air and boat to virtually every corner of the world. More antennas, of a single type, we judge than any other antenna manufacturer in any part of the satellite TV industry today.

The relationship between Gowen and Hatfield has grown and endured through all of the industry's growth. Many early AVCOM dealers also became early ADM dealers. Andy was comfortable working with Jamie, and Jamie with Andy. Andy, 'the pro,' helped Gowen get started. Gowen, the quick learner, helped Andy put new dealers into the business because Andy's receivers weren't worth much if



DID it himself. Jamie probably spends more time 'in the field' helping people use his products, and learning more about his own products with each installation, than any other company head in the business today.

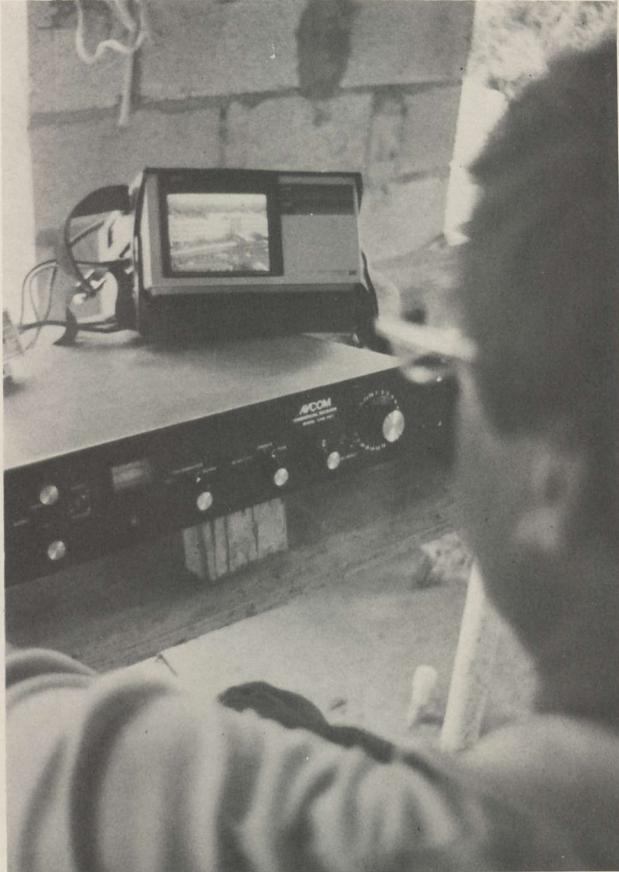
there were no reasonably priced antennas to complete the packages.

While Gowen was learning more about bending metal into parabolic shapes, Hatfield was learning more about eliminating sparks. From the very first AVCOM receiver, they have been top performers. Recently while Gowen and Hatfield were visiting on Provo to field test the new ADM 20 foot dish and the latest (66T) AVCOM receivers, Andy spent nearly three hours, quietly working back and forth with Jamie, to get the last fraction of a dB out of a signal (see **front cover**, this issue of **CSD**). Andy works best alone, locked in his own thoughts, oblivious to the world about him.

About a year ago Andy and Pat Hatfield decided they would like to locate and get back into the plant **the very first** AVCOM receiver ever shipped. Tracing it was not easy. The original owner had upgraded his system to a more versatile receiver and he had sold it. That started a trail of tracing. It proved elusive but eventually number "00001" was located. Today it resides in a special spot at the AVCOM Richmond facility.

Hatfield's approach to manufacturing satellite receivers would be considered inefficient by many; especially those in the far east. AVCOM has what is probably the most extensive 'QC' department and system in the industry today. Andy doesn't share his production quantity with anyone outside his office; the number is simply not public. It would be reasonably fair to suggest that **approximately** 3,000 receivers leave the factory on an annualized basis. Many others are far bigger.

The AVCOM facility is relatively new, to the company, and in house the Hatfield's employ fewer than two dozen people. Andy and Pat consider everyone who works there to be a part of a close knit family. Andy is almost fatherly in his concern, and care, for those who



**OVER** his shoulder. AVCOM's Andy Hatfield spent several hours carefully 'tweaking' on his receiver (66T shown here) and working quietly with Jamie Gowen to get the best possible performance out of the combination of ADM antenna and AVCOM receiver, on Provo in November.

work for AVCOM. Oh yes, Pat resigned as a school teacher a couple of years back to devote full time to carrying her share of the management load.

Andy Hatfield is perhaps the most serious student of satellite receiver design in our industry today. He carefully analyzes every new product, and because he is the designer of every new AVCOM product, and spends hours per day researching and working out circuit designs on paper and then on breadboards, he requires only a few minutes of circuit or receiver board study to evaluate potential performance in other competitive brands.

Just prior to the spring of 82 SPTS/STTI show in Fort Worth, Andy decided to sit down and design a full, new line of receivers for AVCOM. After a series of PSR COM series receivers, each designed for home or semi-commercial use, Andy felt that he was ready to introduce a 'serious line' of products totally designed from the ground up for commercial applications. He knew, in his own mind, that his approach to receiver front ends, IF filtering and amplification, was the right one. His receivers had repeatedly proven themselves in the field as 'better than' even the most expensive and sophisticated SA, M/A and other big dollar units for system threshold sensitivity. But Andy recognized that as long as the 'package' was housed in a form which was created to appeal to the private, home terminal operator, he could never move into the commercial market.

In record, almost lightning time, he had five new receiver designs, each packaged for a different, and demanding, portion of the commercial market ready for the Fort Worth show. At about the same time Andy was devoting his time to his new commercial product line, he was also introducing the COM-2, a lower priced version of the popular

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COM-3 receiver. The COM-2 was probably in reaction to what Andy saw as inroads from firms such as RL Drake, who was (by the spring of 82) starting to ship substantial quantities of TVRO receivers. Andy's approach to the COM-2 was to offer comparable-to-COM-3 operation with pricing in the same region as the \$700 region Drake.

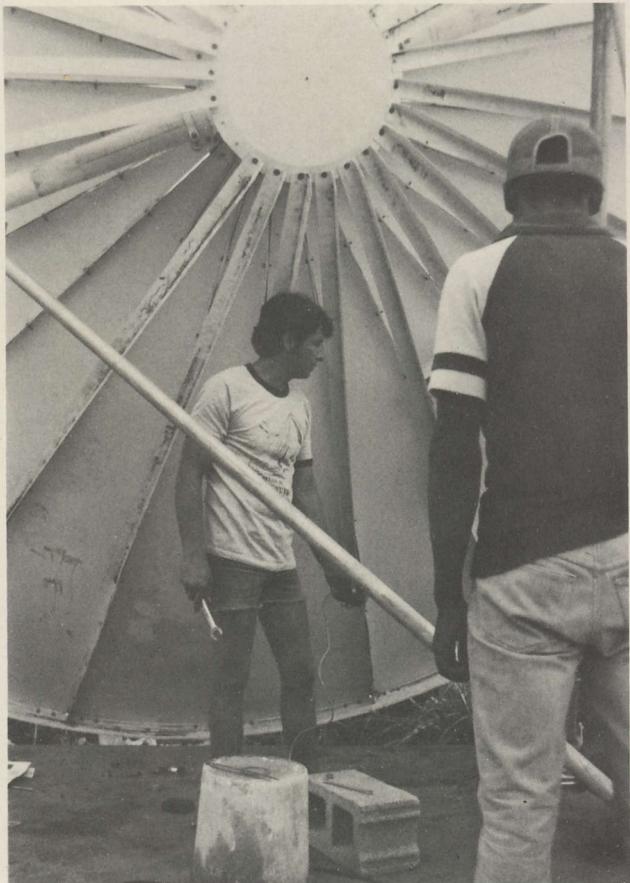
As Andy was tackling the domestic commercial world with several new designs, down in Miami Bob Behar was pounding on Andy's ear asking for a special version of the COM-3 receiver for international satellite reception. There are, as regular CSD readers know, two things that make international signals different than domestic signals:

- 1) Many of the Intelsat transmissions use but one-half of the nominal 36 MHz wide transponder to transmit video. This 'half transponder format' can be **received** with a normal North American receiver. But, it is received **far better** if the receiver has been designed to work with a half-of-36-MHz-wide signal.
- 2) Most of the Intelsat transmissions do not use standard 6.2 or 6.8 MHz audio. Some use a COMSAT (Comstar) 'standard' of 5.8 MHz, some more use an intriguing format that sends the audio to the receivers in the very top 'half' of a half-transponder format service, while the video occupies the very bottom half.

These 'variations' from a standard COM-3 created the need for yet another version; the "international version."

AVCOM would end up 1982 with a greatly expanded line of TVRO receiver products, and a new sense of the commercial as well as commercial-international marketplace. Most of these new products would go largely unnoticed by the typical US/Canadian domestic buyer, but in those market areas where such receivers are difficult to find, they would create quite a stir.

Jamie Gowen, meanwhile, would finally take the plunge into bigger antennas during 1982. Jamie's proven 11 footer was nearing the 10,000 antennas shipped point in the spring of 1982 when the Fort



**NEARLY completed;** Jamie Gowen watches a temporary antenna side monitor while moving the 20 foot ADM Provo dish back and forth with the hand held control.



Worth show rolled around. Many of the 11 footers were going in as 13 footers; ADM had added 'extension panels' to the basic antenna back in 1981. But a 13 footer was a far cry from a 20 footer, or an antenna larger than a 20 footer. So at the Fort Worth show, ADM first displayed their 20 foot version.

On the surface, it looked like an expanded version of the 11 footer. The basic panel design, the hub assembly, and the back side made it appear to be an 11 footer that had eaten too much candy. In the field, it would prove to be quite something else.

The basic 11 foot ADM, plus the 11 and extender panels, had given an excellent accounting of themselves in such industry events as the initial Omaha (81) show antenna field tests. In fact, the 11 footer was found 'best of class' (everyone **now** knows this so there is little point in keeping it out of print any longer) and its performance based upon tests showed it to be better than most of the 12 and 13 footers tested at the same show. To prove it was not a fluke, the 11 footer repeated at the Fort Worth show.

Jamie's attitude about a new product was, from the beginning, very 'laid back.' He knew that jumping from 11 or 13 feet to 20 feet was no simple size expansion and he treated the early 20 footers with the attitude of experimentation. He literally 'gave' antennas to people in Africa and South America, asking that they in turn share with him their results, comments, and recommendations for improved performance as well as improved design. Closer to home, he followed 20 footers personally from his factory to the point of installation and there did or supervised their installation. He wanted feedback, from new users, and each time he found some problem with an installation he would rush back to Poplar Bluff to make the needed change in the manufacturing process.

Also during 1982 ADM hauled test antennas in the 11, 13, 15 and 20 foot class to an antenna test range in Houston. There they learned for the first time what the apparent 'real gain' and real (sidelobe) patterns were for the antennas. Armed with this information, plus the small, but growing number of 20 foot (six meter) installations, he was slowly getting a good handle on the new product size and line.

Finally, early in the fall of this past year Jamie felt he had most of the initial design bugs for the 20 footer worked out. He shipped an antenna to the Turks and Caicos and decided to come down to assist in the installation. Andy Hatfield would also come along and bring with him some of the latest domestic-commercial, and international-commercial receivers. With the weak domestic signals available in the Caribbean, plus the ability to access a wide variety of Intelsat birds using various transponder formats, it would prove both an excellent proving ground for the equipment as well as the ultimate opportunity to compare the performance of both the new antenna and the new receivers against nearly a dozen **other antennas** already in place and operating, and several dozen high grade receivers also in daily use.

Quietly, persistently, without the usual hype and loud announcements, Jamie Gowen and Andy Hatfield have been the backbone of the home and semi-commercial TVRO industry for more than three years now. Both have been people the industry could always turn to for help, assistance, advice and support. Somewhat out of character perhaps, Andy Hatfield has served the industry through SPACE

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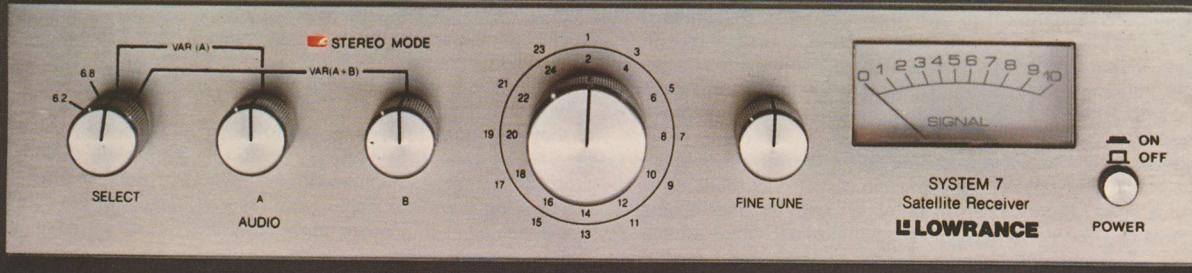
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where in 1983 he is one of the elected leaders. His pet project within SPACE this season is the chairing of a committee that is attempting to establish industry 'technical standards' for equipment performance. Andy finds this to be a very difficult task since there are so many diverse and learned views around concerning every aspect of technical standards. Andy hopes the committee will, before 1983 is over, be in a position to publish minimal standards for such things as receiver (LO) radiation, receiver threshold measurement techniques, antenna gain measurement techniques, modulator performance and a host of other technical 'problems' which the industry is grappling with as it grows into maturity.

For the last couple of years, Andy has also volunteered his time to conduct a 'question and answer' session at the industry trade shows. There, in his quiet and concise manner, he and a few fellow experienced pros patiently listen to installation and service problems from the audience and then try to sort out the best advice they can hand back to the usually neophyte attendees. For Andy, this unstructured 'show session' format is 'comfortable' since there is no formal presentation to be made. And it is the sort of thing that he does six days a week, over the telephone, on a one on one basis.

There is no way of even estimating the number of telephone calls the two have participated in, with new and not-so-new dealers and installers, helping them sort through their problems, often giving them step by step advice. It would be fair to suggest that between Jamie Gowen and Andy Hatfield, there must be 400 to 600 dealers out there who got the kind of help they most needed, **when** they most needed it, over the years.

Even between the two, there is a constant flow of information. Jamie recalls one day that he lost operation of an AVCOM receiver because of a lightning strike on an antenna. Andy listened to his problem, and then sent him to the nearest Radio Schack with a shopping list. When Jamie came back, he and Andy got on the telephone and step by step with Andy in Virginia and Jamie in Miss-

**MAN and his monster.** Jamie Gowen surveys the nearly completed ADM 20 footer installed with his help on Providenciales in the Turks and Caicos this past November. The antenna is outfitted with a motor drive.

ouri, Andy directed Jamie from one section of the receiver to another giving precise instructions on what part to replace, and how. "It took us several hours because I know nothing about electronics" Jamie recalls. "But when we finally got the last part replaced with a makeshift replacement from Radio Shack, I turned it on and it worked right away."

Andy is more than well versed in his own product; he is well versed in human nature. Example. In the COM-2 receiver, there is a fuse which the installer inserts to send DC voltage out of the receiver to the downconverter. AVCOM instructions tell the installer what fuse value to use, and a fuse is supplied with the package. This fuse is designed to protect the receiver if there is some type of lightning strike or other malfunction with the downconverter. Andy knows that it is human nature to substitute a larger fuse for the fuse supplied. "People simply don't want to be bothered with changing a fuse, so they think they are doing a smart thing by sticking in a bigger fuse."

When Andy began to get COM-2 receivers back which seemed to have unexplained power supply related problems, he grew suspicious. Because he is the thorough kind of design engineer that he is, he wanted to know **why** the receivers were having problems, and what could be done to stop the problems. Checking and rechecking his design, he could find nothing to explain the malfunction. When he would question the person returning the unit, they always 'swore' that they had stuck to the **recommended** value of fuse.

Andy was not convinced. So he redesigned the unit slightly and installed a small RF choke looking device in the line with the fused DC powering line. The choke was carefully selected so that it would handle just slightly **more** current than the proper value of fuse. But if



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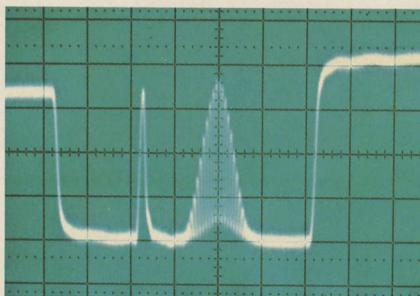
#### Quality You Can See

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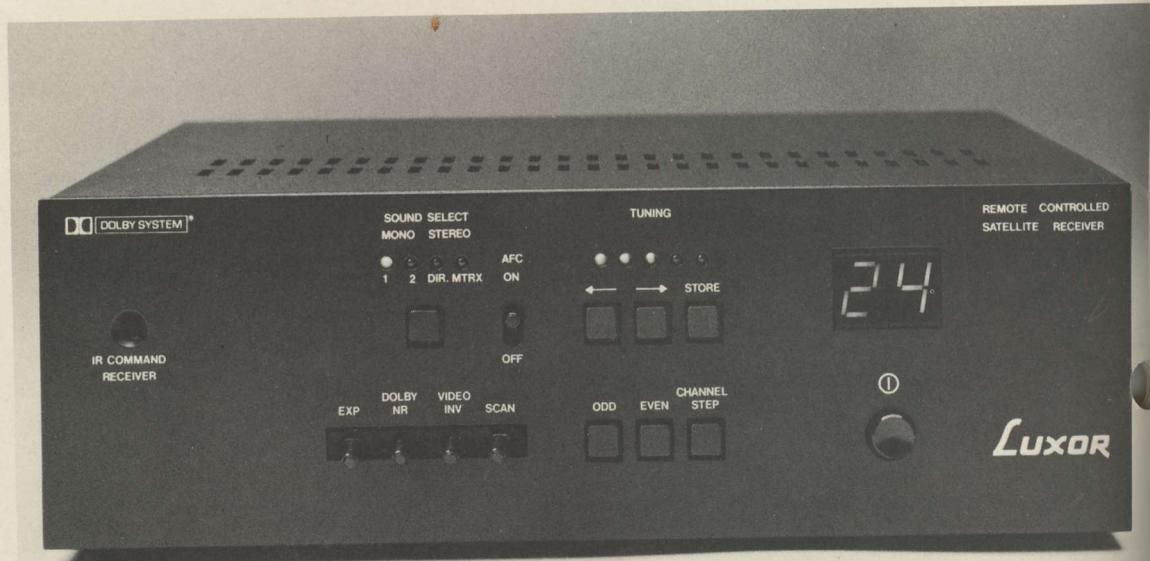
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Video Section									
Defeatable AFC	●			○			○		
No Fine-Tune Necessary	●		○	○			○		
Automatic Polarization With Chaparral Polarotor	●		○	○					
Video Invert	●	○	○	○	○		○	○	
Two Scan Speeds	●								
LED Channel Display	●	○							
Audio Section									
Four Programmable And Tuneable Audio Systems	●								
Mono 1, Mono 2, Direct Stereo, Matrix Stereo	●					○			
Dynamic Expansion	●								
Dolby Noise Reduction	●								
Infra-Red Remote Control									
Direct Access Any Transponder With Chaparral Polarotor	●								
Automatic Polarization (Polarotor)	●								
Select Any Preprogrammed Audio System	●								
All Audio Systems Infra-Red Tuneable	●								
One Tune Polarization (For Satellite Skew)	●								
Down Converter									
Dual Conversion	●			LNC	LNC		○		
Total Features	16	2	1	3	4	1	1	4	0

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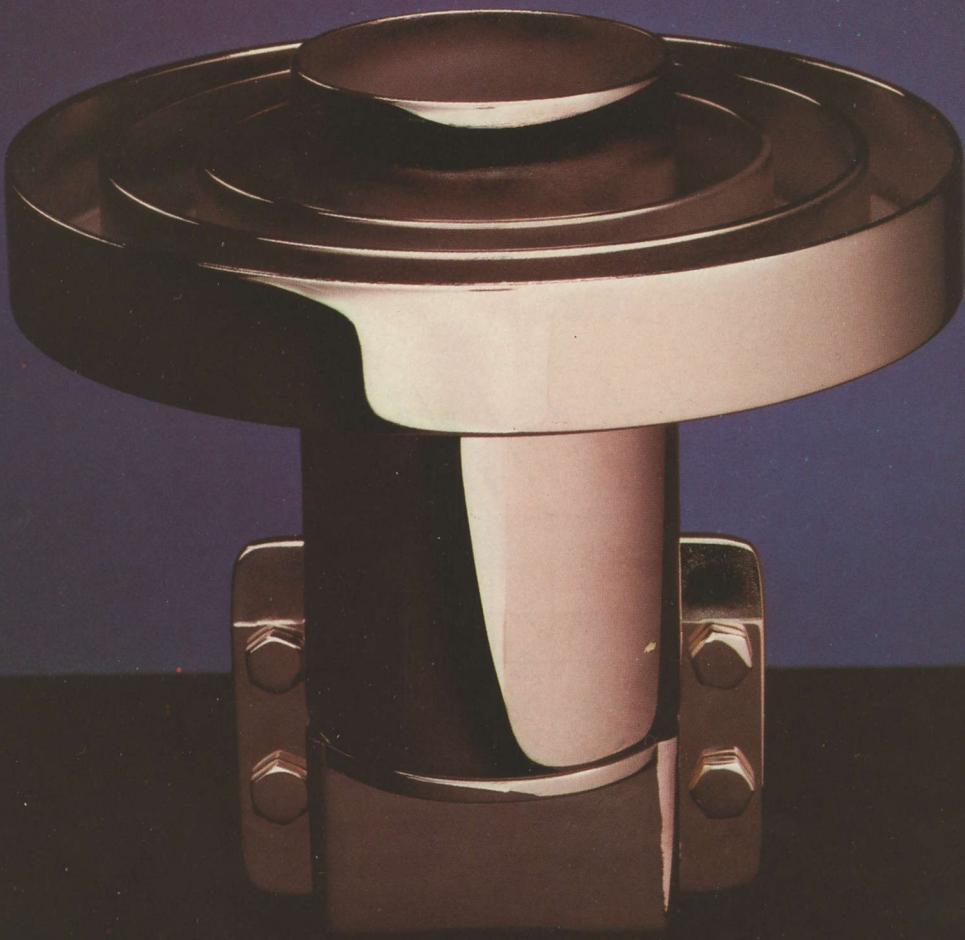
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## **CHAPARRAL**

more current flowed through the RF choke than the fuse was rated to handle, and 'snap' under, then the choke too would fail. In other words, if a person substituted a larger fuse in place of the value AVCOM recommended, the fuse might hold but the RF choke would fail. Ultimately, the excess current would also cause the receiver power supply to quit and then the unit would come back to the factory for repairs.

**"From that date forward when a COM-2 comes back with a power supply problem, I simply open it up and look at the RF choke. If it has 'snapped' I know that there was more current on that line than the recommended fuse would have passed. I also know that the installer has substituted a larger fuse."** People still substitute larger fuses. But usually only once. Now they get a short lecture from Andy on the hazards of engaging in such a practice, and a quick lesson on what a fuse is supposed to do and why the proper value is an insurance policy **for them**.

Any AVCOM receiver Andy now builds is filled with similar 'design tricks' that are intended to keep the users 'honest.' Andy knows and understands human nature, and human failings. He also knows his own abilities and while he and Pat typically put in well over 70 hours a week at the AVCOM facility, he doesn't like to get sent down 'blind trails' researching problems with his own equipment that are not problems at all. To Andy, the RF choke was a 'time protector.' In an instant, now, he can determine why a COM-2 has power supply problems. If the user made a blunder, the unit gets repaired and sent back; **with a repair bill**. If AVCOM made a mistake, then he will drop everything to locate the failure, and take immediate steps to see that future units don't have the same problem.

Both men have given their time and their talents to the growth of the industry. Neither man appears in print very often, neither man gets special treatment at trade shows or from the glamour press that occasionally swoops down, through, and out of this industry creating stories for the mass media. But both men have made (and continue to make) major contributions to the growth and maturity of the industry. Whether you deal with either, or not, if you are in this industry today,

you owe a special debt to their abilities and their attitudes.

**Jamie and Linda Gowen**, quietly and without great fanfare, have shipped more antennas from Poplar Bluff, Missouri than the whole of Scientific Atlanta; and probably more than the M/A COM division Prodelin. If you are, or know, a dealer who has been in this industry since 1980 or 1981, the chances are far better than 50-50 that as a dealer that person began by selling ADM antennas. That is no small accomplishment.

**Andy and Pat Hatfield** created a company which gives them great pride. There are more popular (as in **mass** produced) receivers in the field, but none with more personal commitment to excellence and none where a dealer or distributor can 'get right to the President' any quicker or for more help.

Most of all, neither Jamie nor Andy have lost touch with their marketplace. Jamie is still the same, super-nice guy who works like crazy for as long as there is work to be done, and then he takes off for a day or two of quiet fishing on the Mississippi or some either nearby river. His ADM is now a major employer in Poplar Bluff, and this journeyman welder who traveled all over the United States with wife Linda looking for work ten years ago is now 'back home' where he started. Andy still keeps a tight, close, personal rein on the product leaving AVCOM nad his mind never stops collecting data and sifting it through looking for ways to do something better. Where others have insisted that growth only comes when you have **cheaper** production costs, Andy has not been tempted. He feels deeply that growth only comes from doing a job **better**, and passing the innovations in better performance onto the user.

To both Andy and Jamie, **CSD's** congratulations for not being tempted by their own success. The industry is far better because they are a part of it, and others who would strive to make their own companies a success would do well to study carefully why personal pride in their products and a deep commitment to helping the little guy get started is the primary reason why ADM and AVCOM are the successful firms they are today.

## SAVE BUCKS HAVE FUN! BUILD YOUR OWN DISH

The following describes how you can build your own ten foot parabolic dish, feed assembly, and dish mount using materials which you can find in your local hardware store.

### BUILDING THE DISH

The dish described here is ten feet in diameter and has a focal length to diameter ratio of .45. Ten feet was chosen because it is a reasonable size for a first dish construction project and it permits quality TVRO performance on several satellites. The F/D ratio of .45

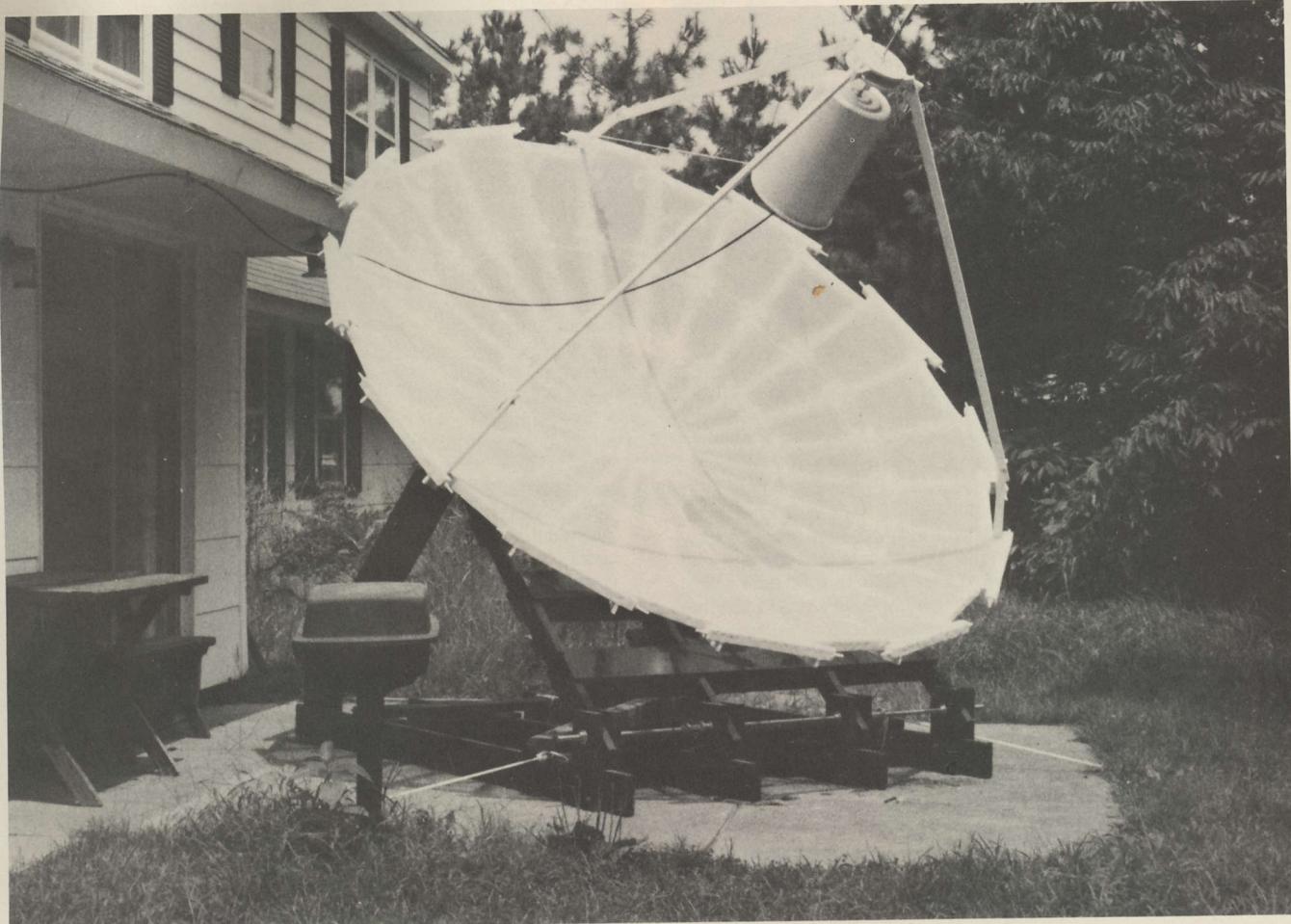
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### ANOTHER IN A SERIES —

Author/reader Barry Guard details a low cost, garage type construction approach to building your own parabolic reflector utilizing materials which are totally available at your local hardware store. **CSD** readers are encouraged to prepare for publication materials based upon their own experiences and innovation. Articles selected are automatically entered in our annual 'Reader Contest' and the best article in the series, each 12 months, is rewarded by an all expense paid vacation trip to Providenciales in the Turks and Caicos Islands, for two, from **CSD**. If you have something to write about, call or write to Carol Graba for full details!

was selected so that the dish could be extended in the future to realize a lower F/D, which would remain in the region of compatibility with readily available feed antenna radiation pattern characteristics.

The dish shown in the photo has 24 radial plywood struts. Information required to build the struts and hub assembly is shown in **figure 1**. Cut a strut template from either wood or plastic using a scroll saw. **Painstakingly plot** approximately 100 points or more of the parabolic curve and very carefully cut along the line — you don't want to throw away antenna gain at this juncture! Use the template to trace out and cut the 24 struts from 1/2" exterior plywood grade AC or better. Marine plywood is ideal. Save that template! It's valuable. Some builders will use no more than two 4' x 8' sheets of plywood for the struts. Others will spill over into a third sheet of plywood. Cut an 18" circle in 3/4" plywood for the front hub and a 24" square from 3/4" plywood for the rear hub. The struts are braced all the way around the dish with three rings of braces. Brace construction and position information is provided in **table 1**. Essentially, the braces are two by twos made from one by twos which are slotted prior to assembly to permit 3/8" threaded rod to go all the way through the center of each brace. Only the outermost ring has continuous two by two braces with 3/8" threaded rod; whereas the inner two rings have two by two blocks with 3/8" threaded rods going through their centers as well. The **tricky**



thing about the braces is that they are cut at **compound angles**, since they are flush with the parabolic curve. These compound angles are functions of the distances of the braces from the center of the dish, and, the positions of the braces along the parabolic curve. The corresponding saw blade tilt angles are shown in table 1. Assemble the dish upside down on a flat surface using the lengths of threaded rod indicated in table 1 and sandwich the struts in the center between the front and rear hubs using thirteen 5/16" x 5-1/2" bolts, nuts, and washers. A slight **shimming** of the outermost brace ring **may be required** to realize the required dish depth precisely. Additionally, you may find it convenient to hold the struts to the front hub with right angle brackets to facilitate assembly.

#### Laying the Reflector Surface

The reflector surface is cut from a roll of standard aluminum window screen which is 42 inches wide by approximately 60 feet long. Two reflector sectors can be cut easily from one 5 foot length of the 42" wide screen. Apply the screen to each sector, working from near the center of the dish out toward the periphery of the dish. Apply staples very closely together and alternate from one side of each sector to the other while pulling the screen tightly across and back from the stapling points. Custom fit, wrap, and staple each sector of the screen around each of the two by two outside braces. Cut most of the overhanging excess screen away from the sides of each sector using straight-cut metal shears.

As a consequence of the 24 radial struts, the 10 foot dish diameter, and the screen laying straight across adjacent struts, a very slight gain degradation at 4 GHz results when compared to the gain expected from an **ideal** parabolic surface. Since this gain degradation becomes worse for larger dishes, a considerably larger dish should have considerably more than 24 radial struts near the periphery or a combina-

tion of struts and circular braces which are flush with the parabolic surface.

#### FEED ASSEMBLY

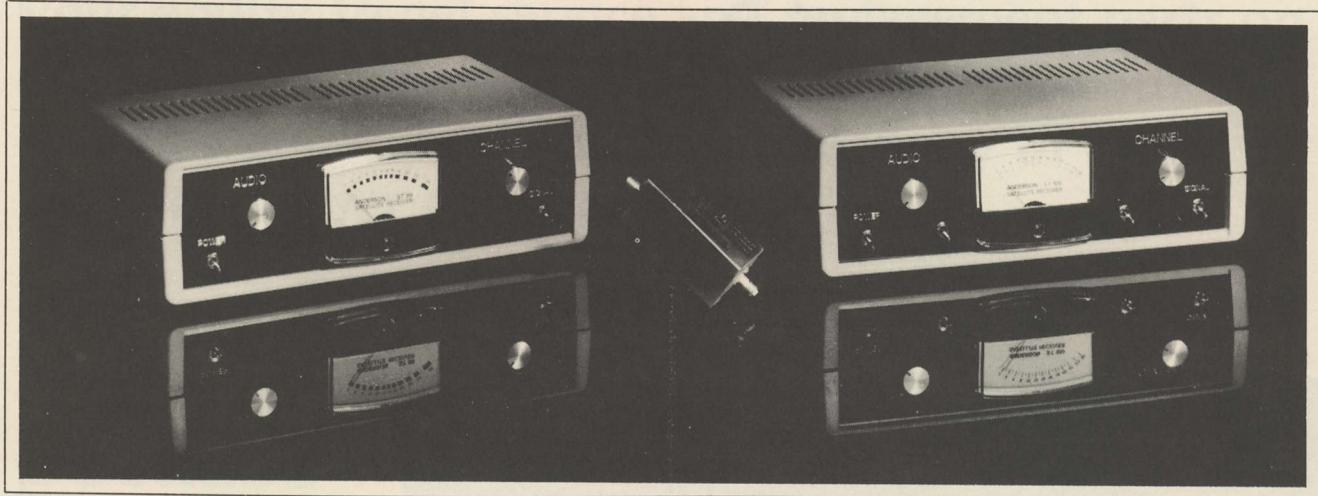
As shown in a photo, the feed assembly is held in place by a tripod constructed from one by twos. The feed plate consists of two approximately 8-3/4" circles cut from 1/2" plywood which sandwich three short pieces of one by two using six 1/4" bolts. The tripod is bolted to the short one by two pieces with three 1/4" bolts. A two by two with 1/2" threaded rod similar to the brace construction runs through the center of the feed plate and is clamped to the LNA with two small pieces of plywood and four short lengths of 1/4" threaded rod with wingnuts and washers. You may have to alter this somewhat to **ensure** that your **feed antenna is colinear** with the 1/2" threaded rod which goes through the center of the feed plate. The adjustable protrusion of the 1/2" threaded rod permits "tweaking." (I was told by an old British engineer once that the correct term is "twiddling"—but I think he may have been referring to knobs.) An upside down plastic wastebasket with a 1/2" hole drilled through the center of the bottom constitutes an effective feed shroud. Since there is a considerable moment arm produced by the position and mass of the feed antenna and LNA, parachute cord can be used to provide additional support by running a piece of it around the feed antenna to the top of the dish. A list of materials for the dish and feed assembly is provided in **table 2**.

#### DISH MOUNT

The dish mount, as shown in a photo, consists of a dish holder, a base, and two elevation adjusters. The base is considerably heavier than the dish holder, and together they result in a **low combined center of gravity** which is important for dish wind loading considerations. The entire assembly, including the dish has withstood considerable windloading with no ill effects. However, just to be safe, the base

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FIGURE 1 - DISH PROFILE

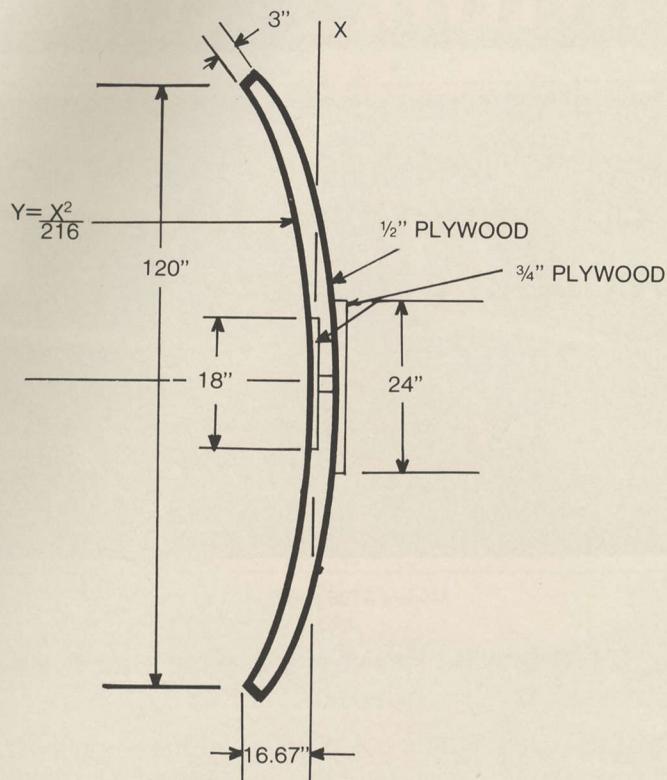


Table 1 — Key Dimensions for Braces

Outside Distance from Dish Center (inches)	Outside Brace Width (inches)	Saw Blade Tilt (degrees)	Threaded Rod Length (inches)
60.0	15.167	3.61	24
43.0	10.730	2.73	18
26.0	6.292	1.71	12.5625
57.5	14.515	3.49	21.875
40.5	10.077	2.59	17.375
23.5	5.639	1.55	12

**NOTE:** Run the two by two braces through saw at 7.5 degrees with indicated saw blade tilts. Only outermost braces are continuous two by twos with threaded rods; the two innermost rings use short two by two blocks cut at the indicated angles and threaded rods.



Table 2 — Materials for Dish and Feed Assembly

ITEM	QUANTITY
4' x 8' x 1/2" AC plywood or better	2 or 3
2' x 4' x 3/4" AC plywood or better	1
1" x 2" x 8' clear pine	29
3/8" x 36" threaded rod	36
3/8" nuts and washers	240
5/16" x 5-1/2" bolts	13
1/2" x 36" threaded rod	1
1/2" nuts and washers	8
1/4" x 36" threaded rod	1
1/4" wingnuts and washers	8
Plastic wastebasket	1
Aluminum window screen	42" x 60'
Staples and paint	Variable
Glue, screws or nails for brace assembly	Variable

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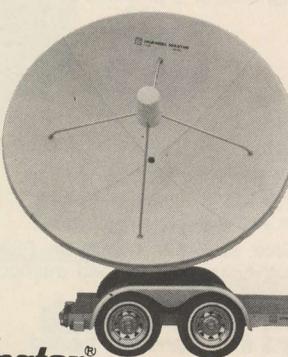
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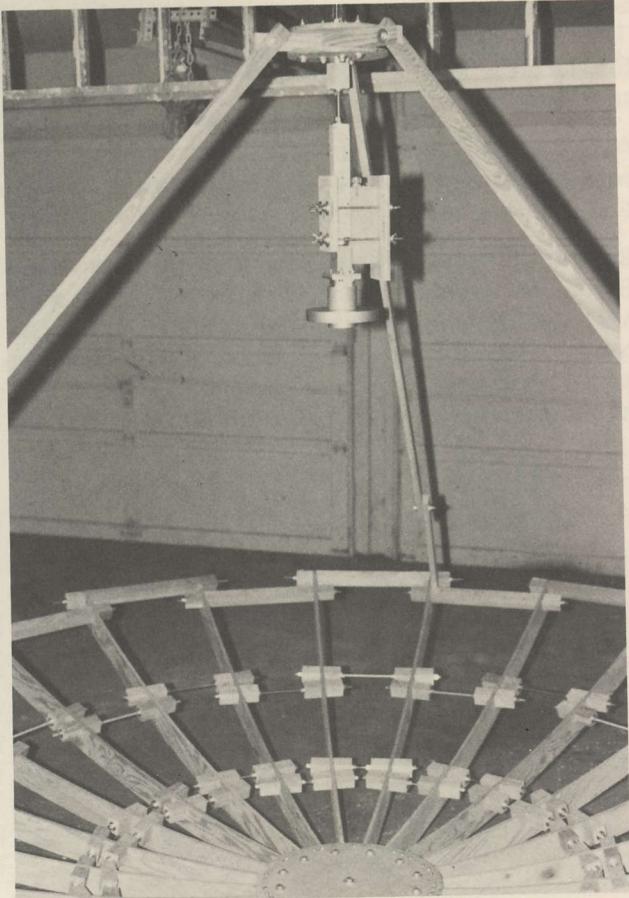
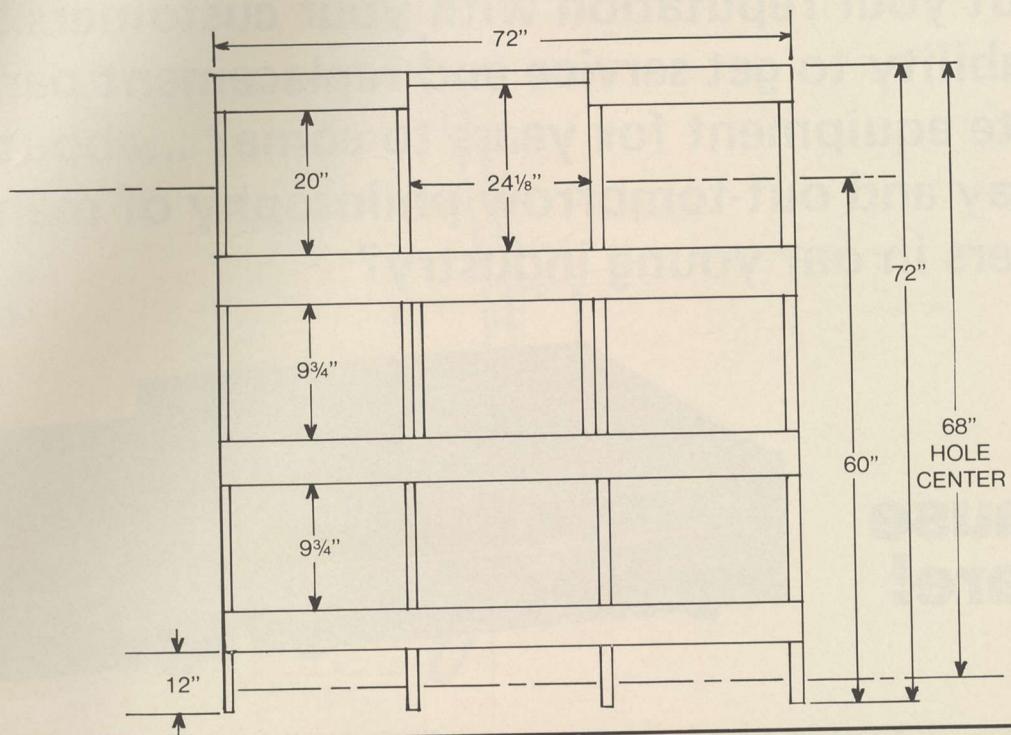
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FIGURE 2 - MAJOR DIMENSIONS OF DISH HOLDER

— BACK VIEW —

1" x 6" SANDWICHING 2" x 4"



is held to stakes by strong tie lines. The major dimensions of the dish holder are shown in figure 2. The dish holder is sandwiched between the rear square dish hub with shims, and two lengths of two by fours with 1/2" bolts. The bottom of the dish's square hub rests on a two by four crossmember of the dish holder. The lower rear of the dish rests on shims between the dish struts and the second from the bottom crossmember of the dish holder. This gives the dish greater stability than many of the commercially available dish holders provide. The base is straightforwardly constructed from two by sixes, four by fours, two by fours, and 1/2" bolts. The holder rotates around the front of the base on 3/4" rod. This is considerably safer than rotating around the horizontal centerline of the dish as many do. The elevation adjusters are constructed from two by fours, one by sixes, four by fours, 3/4" threaded rod, and 1/2" threaded rod. Two 3/4" bolts connect the elevation adjusters to the dish holder at the horizontal centerline of the dish and two 3/4" bolts connect them to the rear of the base. The entire structure is rotated for azimuthal pointing. The elevation adjusters are capable of going from F3 to F4 at my location. A list of materials for the dish mount is provided in table 3.

Table 3 — Materials for Dish Mount

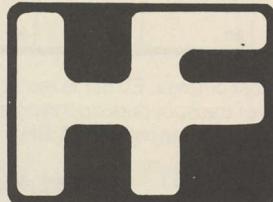
ITEM	QUANTITY
2" x 4" x 8' pressure treated	19
1" x 6" x 6' pressure treated	12
Glue, screws or galvanized nails	Variable
3/4" bolts with nuts and washers	4
3/4" x 36" threaded rod	5
3/4" nuts and washers	16
2" x 6" x 8' pressure treated	8
4" x 4" x 8' pressure treated	2
1/2" bolts with nuts and washers	48
1/2" x 36" threaded rod	2
1/2" nuts and washers	8

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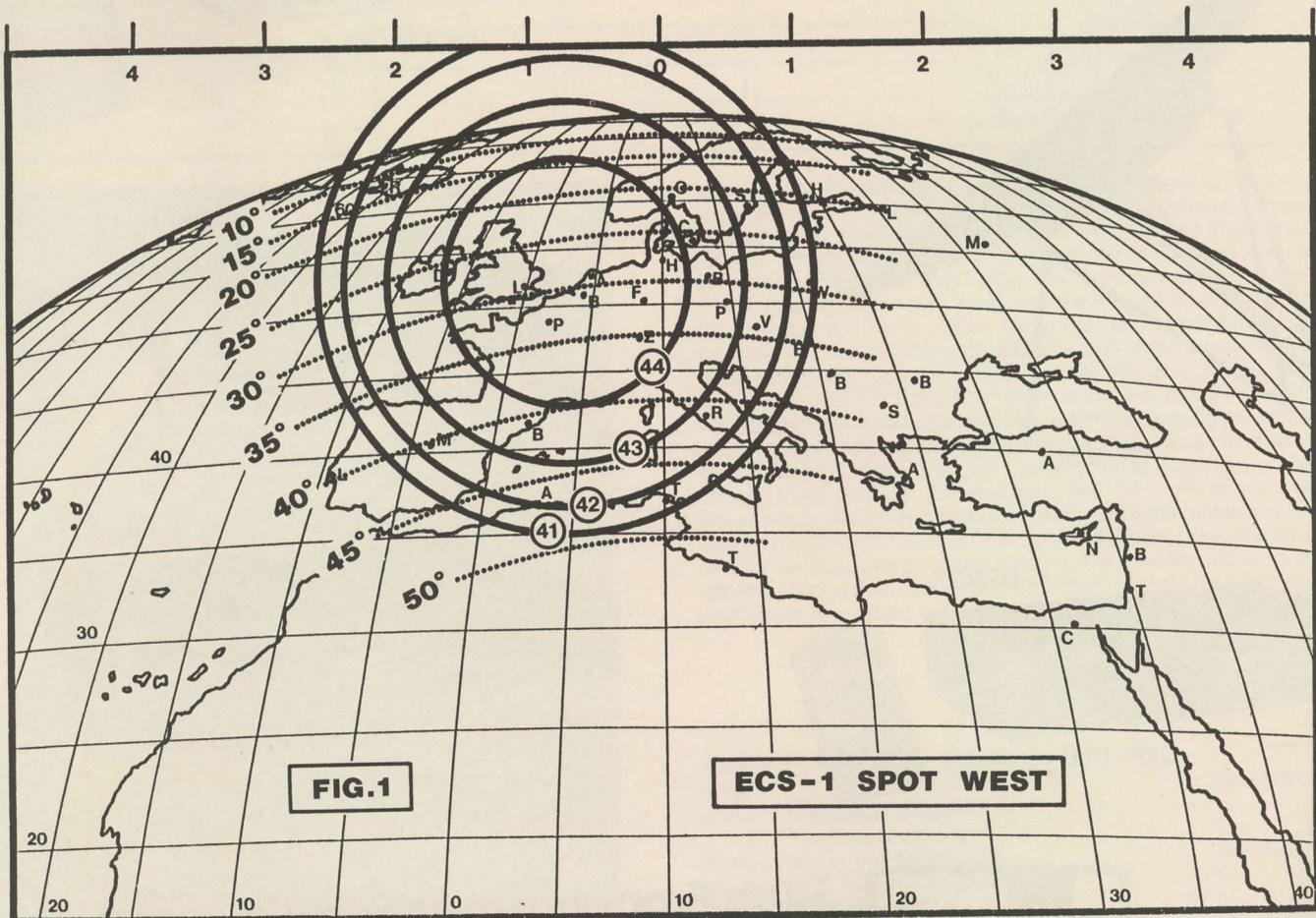
## EUROPE TO NORTH AMERICA

Satellite Television PLC, self-styled Super Station Europe, has launched the age of satellite-delivered cable TV programming east of the Atlantic. Not a true super station (it has no **broadcast** outlet), STV has established itself as the first Pan-European cable channel, with upwards of two hours per evening of English-language entertainment programming and international advertising, transmitted from London via the British Telecom Research Laboratory at Martlesham Heath,

Suffolk, up to the Orbital Test Satellite. The 11.64 GHz downlink is available to any cable operator willing to carry the programs, and having permission from his country's telecommunications authority. The OTS spot beam places an EIRP in excess of 41 dBw over most of Western Europe, within which region required antenna size varies from 1.8 to 3.7 meters.

OTS has two spot beam transponders. The one not used by STV carries a nightly feed of French TV to Tunisia. **Both transmissions are scrambled**, at the insistence of Eutelsat, the OTS governing body. Anyone else wanting to deliver Pan-European programming has to look elsewhere. The obvious choice is the forthcoming European Communications Satellite, ECS. ECS-1 is currently scheduled for Ariane launch in April, and ECS-2 will fly probably later in the year. **Figure one** shows the footprint of the western spot beam ('**spot west**'), the only downlink beam suitable for cable service in this area. At 45 dBw its boresight EIRP will be some 2 dB lower than OTS, but shifted north-west to favor the United Kingdom. In fact that 2 dB is the amount by which ECS spot beam antenna gain is below that of OTS, spreading the 20 watts transponder RF power thinner, but over a wider area.

Eight transponders are switchable to the ECS spot west downlink, but how much capacity is available for Cable TV service depends upon the requirements of the PTTs comprising Eutelsat. OTS cannot go on forever, and it looks doomed to retirement shortly after ECS-1 is commissioned. So the existing OTS services will be claiming space on ECS. It may be that some prospective operators have to wait for ECS-2 before gaining access to their market. In due course a Euro-



INTELSAT V: A NEW CONTENDER FOR EARLY-ENTRY DBS AND FOR CABLE TV FEEDS INTO AND WITHIN EUROPE

By Stephen J. Birkill

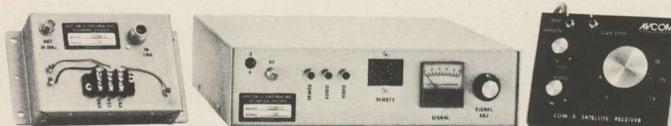
pean 'Cable Bird' must emerge. ECS-1 is restricted to a maximum of nine (out of its twelve) transponders operating simultaneously, while ECS-2 can run all twelve, or ten regular (11 GHz) transponders plus its

TEXT CONTINUES / page 32

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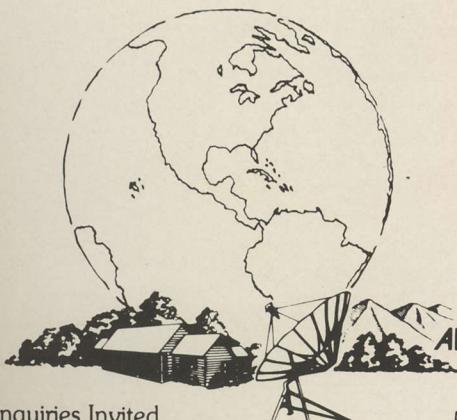
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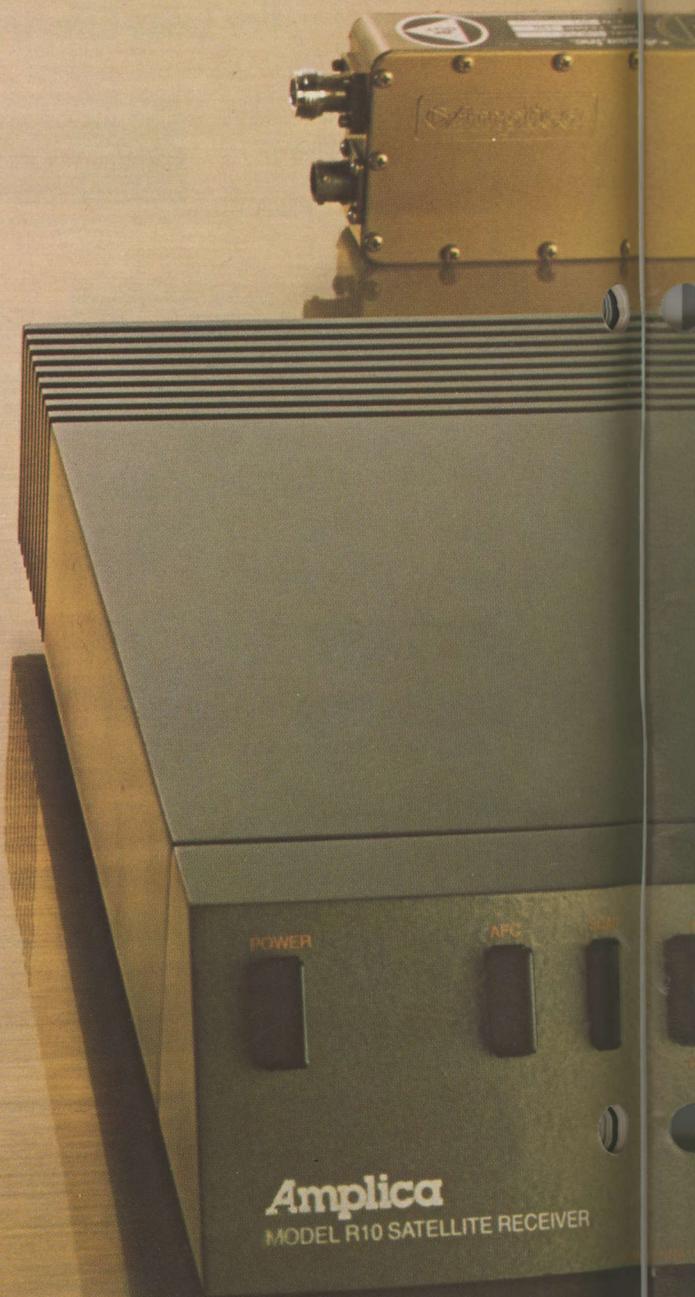
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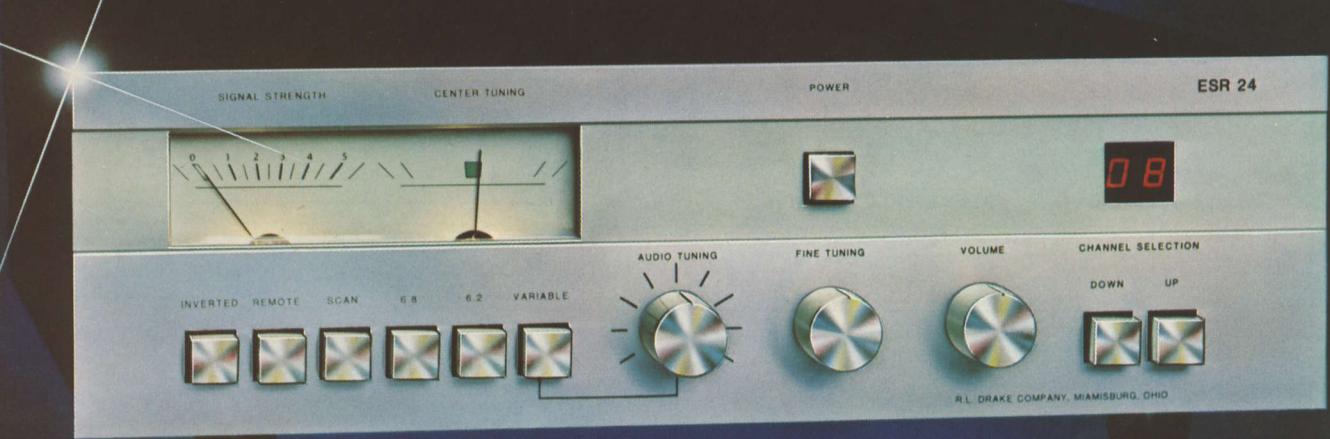
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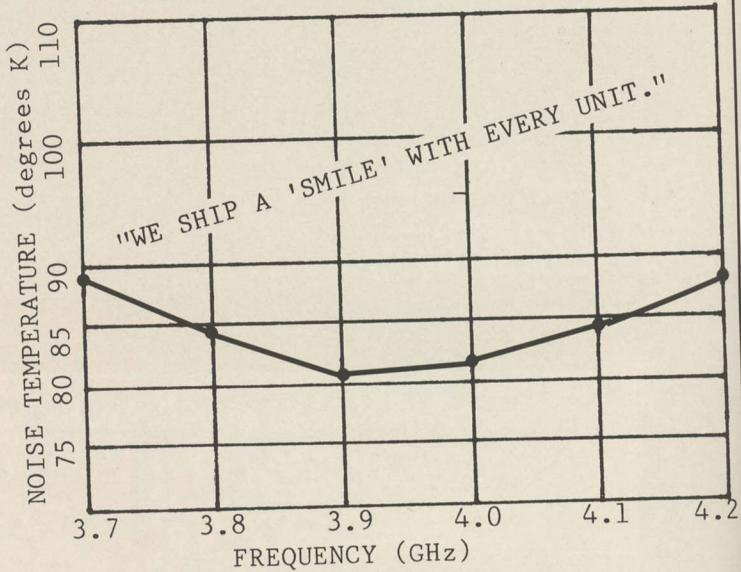
-- If you're buying an antenna, a Lower Noise LNA can reduce your antenna size requirement.

-- If you have sparkles or want to receive more channels a Lower Noise LNA will help, unless the problem lies in the rest of your electronics. Remember, the lowest noise temperature in the world won't solve a bad connector, a cable, a receiver, or other problem component.

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-- LNA Performance is affected by the sun. NT is measured on the same scale as centigrade. As an example, placing any LNA in the sun such that the temperature of the input transistor rises by 10 degrees centigrade worsens your noise performance by 10 degrees. One cost effective aid is to use a shroud or insulating cover over the LNA. The shroud should have shadyside openings for air circulation. Cold weather improves LNA performance.

-- Insure you have sealed, water tight cable. See the June Coop's Digest on what "worms" can get into your cable, connectors and LNA, if you don't seal your cable.

-- Gold plated connectors have less loss and less degradation over time than cadmium plated connectors.

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two 12.5 GHz 'Multiservice' transponders, or some combination. This would point to ECS-1 being the eventual cable TV satellite, with all switching options in the 'spot west' position.

But until then there will be fierce competition for space. Some of the pressure could be relieved by the use of an alternative satellite system, and the program-providers have only recently begun to appreciate that such a system already exists. There is considerable spare capacity in the **Intelsat global system**, capacity which the International Telecommunications Satellite Organization is anxious to lease out to members requiring domestic, regional or international service. The latest generation of satellites, **Intelsat V**, carries a Ku-Band communications payload with three transponders downlinking in each of two steerable spot beams, one east and one west of the sub-satellite point. The 11 GHz downlinks may be accessed either via 14 GHz uplinks or by 'cross-strapping' within the satellite from 6 GHz C-Band uplinks.

11 GHz downlink frequencies fall in precisely the same sub-bands as used by ECS, 10.95 to 11.20 GHz and 11.45 to 11.70 GHz. Transponder channel complement is two of 80 MHz nominal bandwidth (72 MHz specification), switchable to either beam, and one of 241 MHz bandwidth in each beam. Polarization is **linear**, like ECS, and EIRP is specified at 41.1 dBW minimum in the eastern spot beam and 44.4 dBW in the western spot.

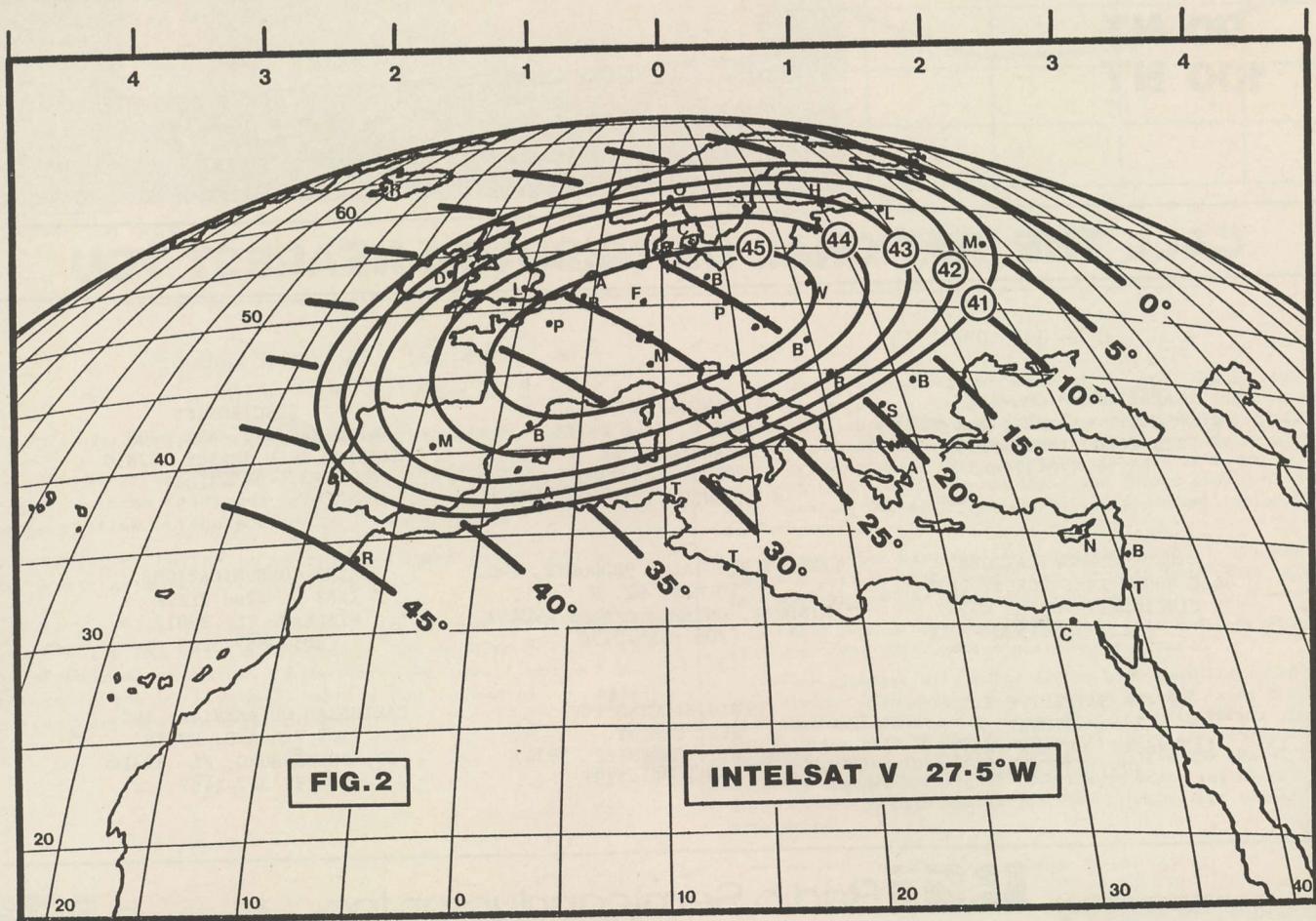
The reaction to these figures might be to dismiss the eastern spot as too low in power for cable TV, that even a three-meter terminal will be too close to threshold for cable grade service, and that we should consider only the western spot, which for Europe would involve the use of an **Indian Ocean**, rather than Atlantic Ocean, **Intelsat**. This would be wrong, for in some ways the eastern spot beam of the Atlantic Reserve Intelsat V is the preferred choice for European cable TV, as we shall see.

First we must realize that Intelsat specifies its EIRP in terms of a **minimum** value over a required coverage area. Within that area the

maximum EIRP is often rather more than the standard 3 dB in excess of the beam-edge value. In fact, typical values of beam-center (bore-sight) EIRP in the 11 GHz downlinks are **49 dBW western** and **46 dBW eastern** spot beam, at saturation. Precise values differ between satellites and transponders, though Intelsat has complete data on file. The lower EIRP on the eastern beam arises from the need to shape that beam to elliptical cross-section to effectively cover Europe from the Atlantic location or the Arab Gulf states from the Indian Ocean slot. The western beam of circular cross-section is adequate for the US heavy-route station at Etam, WV, in the Atlantic Region, and central-European coverage from the Indian Ocean satellite, **Standard-C'** Ku-Band terminals being provided in Italy, France, West Germany and the United Kingdom. It will in fact be some time before the Ku-Band space segment is fully utilized; at present there appears to be traffic only on the Atlantic Primary satellite at 24.5°W.

**Figures two and three** show the type of footprints to be expected over Europe from the Atlantic and Indian Ocean 'spare' Intelsat V birds, the ones most suitable for transponder lease. An absence of conflicting traffic requirements has been assumed, such that each beam might be adjusted for optimum coverage of Western Europe. Each spot beam antenna has its own **independent** antenna pointing mechanism, and such adjustment is quite feasible. No allowance has been made for pointing error at the satellite — this will be typically less than 0.1 degree. EIRP is shown out to the estimated position of the 41 dBW contour, to enable a direct comparison to be made between the two beams, as well as with the ECS footprint. Also shown are lines of constant elevation angle, in five degree steps.

The cross-sectional shape of the Intelsat beams is distorted in this projection, which shows the earth as seen from a satellite at 10°E. The beam pattern is elongated as it intersects the earth's surface at low elevation angles, and the resulting shape is foreshortened by virtue of the observer's viewpoint. Only the ECS beam is shown in its true cross-sectional shape. But all contour values represent typical satel-



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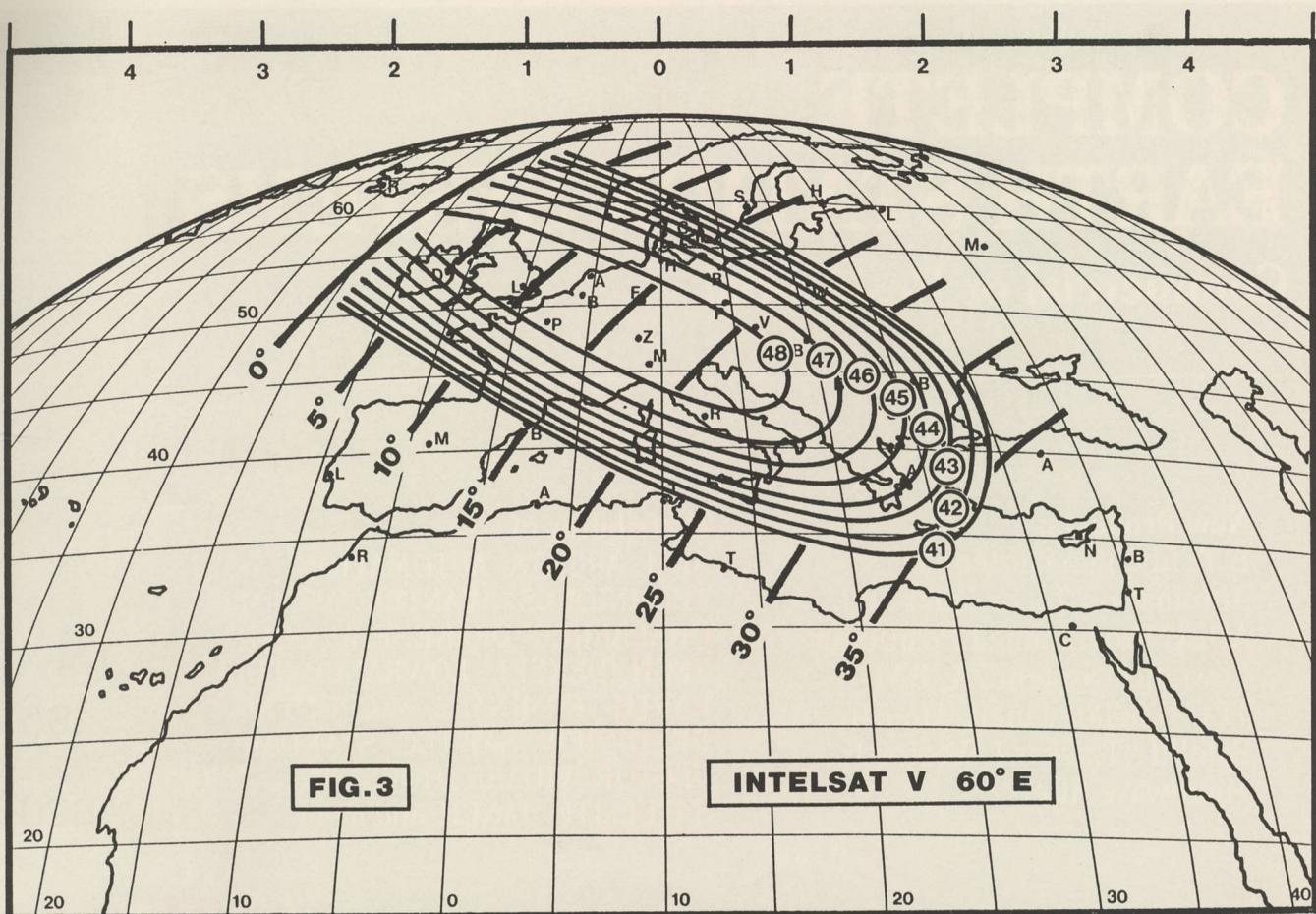
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lite EIRP, in dBw, in their direction.

Looking first at the coverage from the Indian Ocean bird (figure three), it can be seen that the U.K., Belgium, Holland, Luxembourg, Switzerland, Austria, plus parts of France, Germany and Italy, are seeing the highest signal levels. A 1.2 meter antenna will yield sparkle-free pictures within this 48 dBw contour, assuming receiver noise figure in the 4 dB region, adequate elevation angle and a clear sky. Usable cable service (3 meter antenna) will prevail out to around the 41 dBw contour. This excludes the Iberian peninsula and all northern parts of Scandinavia. Even in southern parts of Norway and Sweden service could be unreliable. At places such as Oslo, 7 dB below boresight, small satellite attitude variations could result in several dB of signal fluctuation. Steering the beam north-eastwards would provide a service to Stockholm and Helsinki at the expense of France, Ireland and south-west England. A south-westerly bias would favor Spain, Portugal and the Balearic Islands while depriving all of northern Europe of its service.

Worse still, look at the elevation scale. Virtually all interested locations would see the satellite at less than 20 degrees elevation, the U.K. having less than a ten degree look angle to the bird. This could make for considerable difficulty in antenna siting to achieve sufficient horizon clearance, as well as increasing antenna noise temperature due to sidelobes 'seeing' more thermal noise from the hot earth. System margins would have to be increased to cope with the greater risk of precipitation outage (rain fades) on the longer signal path through the lower atmosphere.

Consider next the Atlantic satellite (27.5°W). The 45 dBw contour encloses the Benelux countries, Germany, Switzerland, Austria, most of France and part of Italy. The 'stretched' beamwidth in the north-west/south-east direction means that EIRP declines more slowly 'across' the beam, compensating in part for the elongation 'along' the beam due to the angle of arrival. So the 41 dBw contour now includes most of the probable cable service destinations. And EIRP in the

central region is higher than ECS will give (threshold on 1.8 meter terminal). Elevation angles are above 15 degrees to all users except those in northern Scandinavia, and the majority in the central area will find themselves with look angles of between 20 and 30 degrees.

Again, there is scope for repointing — here boresight is (like OTS) near Bern in Switzerland, but a north-westerly movement would improve service to Scotland and Ireland, while south-easterly tilt would deliver a usable signal to Sicily and Malta. These decisions need to be made before the start of a full-time service, remembering that all three transponders go together.

The question of a split must arise; a cable operator must choose between ECS-delivered and Intelsat-delivered programming, or, install two terminals. With sufficient contenders the problem will arise anyway, until Eutelsat can stack them all on one bird. Should a split be inevitable, the three-degree spaced ECS series at least will be within the range of a dual-beam antenna. ECS and Intelsat form a more difficult combination. Should a cable programmer go to Intelsat, there may be incentives for users to go with him — this will not be without precedent!

In case it hasn't occurred to readers, the Atlantic downlink need not be accessed via a European uplink — the sending end could well be on the other side of the Atlantic Ocean. US programmers have expressed interest in the European cable TV market, and Intelsat tariffs exist for full-time international TV transmission. An uplink EIRP of 83 dBw at 14 GHz will saturate the transponder. That's 2 kW to a 3-meter antenna, or 550W to a 5.5 meter, though Intelsat will in all probability insist upon a terminal meeting their standard 'C' specification. But, in principle, there's nothing to prevent an American programmer putting his product through an NTSC-to-PAL converter and up-linking a 24-hour per day service via a single satellite hop into European Cable TV outlets.

Coop reported recently (CSD; November, 1982) that the Germans



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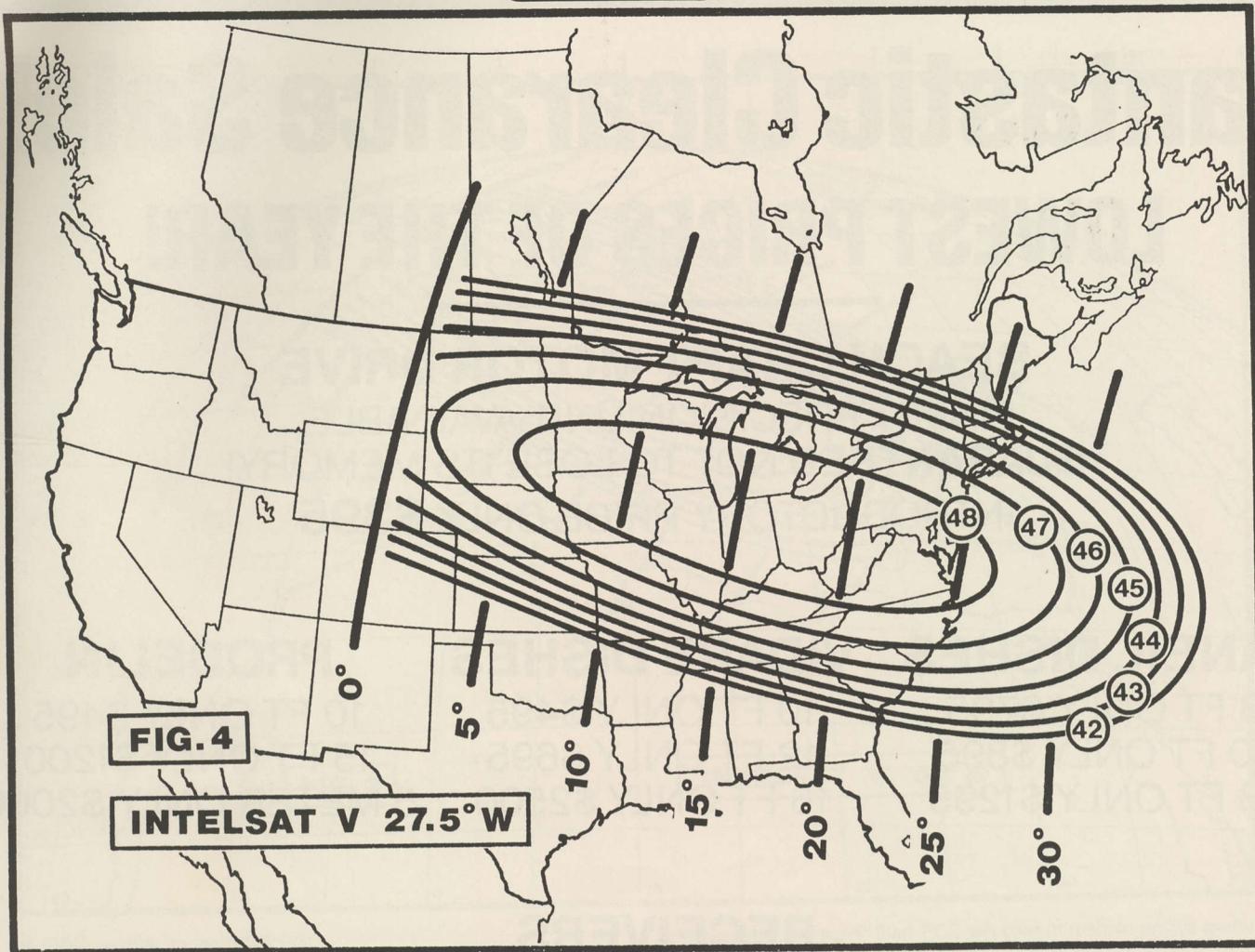
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were looking towards an 'interim' or 'early entry' DBS operation (similar to the Anik C USTV plan) using Intelsat to bridge the gap until their high power DBS 'TV-SAT' is ready (possibly 1986). The comparison with the American plan is valid frequency-wise, although the disparity in power levels (between interim and full DBS) is greater in Europe. In both cases the interim band is directly **below** the DBS band; in the US the early-entry services will downlink 11.7 to 12.2 GHz while DBS (pre-judging the outcome of RARC-83) will occupy 12.2 to 12.7 GHz. In Europe the ECS (and Intelsat) band is 10.95 to 11.7 (with a gap between 11.2 and 11.45), and the DBS band 11.7 to 12.5 GHz. Use of a transponder frequency just **below** 11.7 GHz would allow Germany to use DBS-band receivers with just a small adaptation for early-entry service. In practice this means ECS transponder 6X or 6Y (spot west) or Intelsat V slot 7-12, near the upper edge of the 241 MHz slot. Or indeed Loutch (Luch) transponder 10, if that became available.

The Indian Ocean Intelsat beam of **figure three** would need a north-easterly shift to place full EIRP into northern Germany, but at 48 dBw minimum, **home-grade** service could be achieved with a **1.2 meter antenna** with the now standard 4 dB LNC noise figure. Worst case elevation angle at 13° **could be** a problem.

In the Atlantic beam the whole of Germany would see in excess of 45 dBw with a minimum elevation angle of 20°. An antenna aperture of at least 1.6 meters would then be required — too large, I fear, for most **residential** users. A 3 dB LNC could reduce this back to 1.2 meters, at some cost (1.2m is about 4 feet).

Considering the use of Intelsat V for additional early-entry services in the United States, we have a footprint looking something like **figure four**. Boresight is nominal, here shown as Etam, West Virginia. The axisymmetrical spot beam is elongated towards earth horizon (0° look

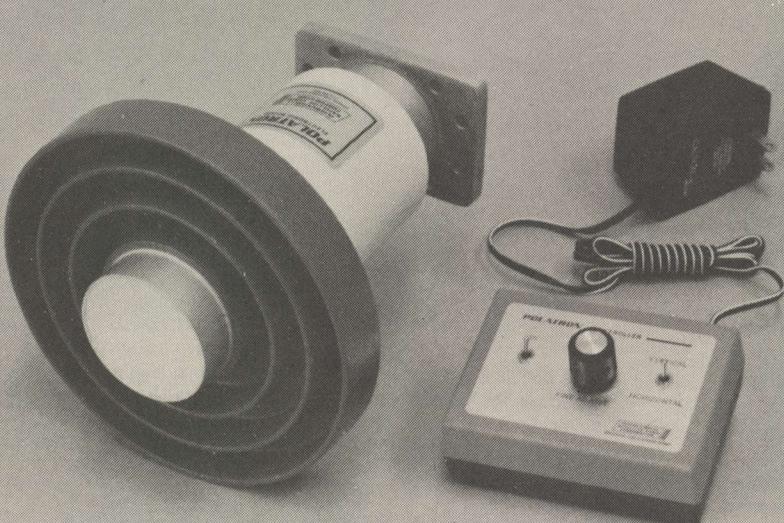
angle, the visibility limit) but narrow across the beam (north-east/south-west direction). Still, it compares favorably with the **eastern pair** of Anik C beams, and could be steered north or south to adjust the coverage area. Elevation angles are low by American standards, limiting effective service to those regions **east of** the Mississippi.

The crunch comes when we look at the frequencies. The North American fixed satellite service (domestic) band of 11.7 to 12.2 GHz lies **between** the international (and European) FSS band (10.95 to 11.7 GHz) and the American DBS band (12.2 ± GHz to 12.7 GHz). So the closest part of the Intelsat band is 500 MHz **away from** the DBS band. A fully flexible DBS receiver would not only have to cover 11.7 to 12.7 GHz **but also be extended below** 11.7 GHz into the Intelsat band. This degree of flexibility sounds costly for the DBS manufacturers, and points to the use of more specialized receivers for the different sub-bands. We will wait to see what the 12 GHz designers come up with.



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## PROVO SATELLITE RETREAT

### RETREATING TO An Island

The concept of packing it all up and disappearing from the relative safety and comfort of one's own office, to head to a 'remote' island in the Caribbean to discuss business seems pretty far out on the surface. In actual practice, it turned out to be one of those 'Better Ideas' which will be producing industry benefits for years to come.

We had originally hoped that there might be as many as 30 'Retreat' participants. We ended up with around half that number, plus a fair number of 'family members' in the form of wives and children. And after getting through the week's session, most of us agreed that:

- 1) We would do it again (all **but one** asked to sign up, before leaving, for the next 'Retreat'), and,
- 2) Keeping the group small, say 15 active participants, seemed like the best way to go.

The attendees represented a broad spectrum of the industry itself; surprising, perhaps, for so few total number of participants. There was representation from the installing dealers, from Low Power TV, from hotel and motel wiring, from cable TV, from distributor, and from manufacturing ranks. Only the absolute end of the chain, the non-technical, non-business involved end user was not personally on hand.

The retreat was arranged so that the attendees came to Provo from Fort Lauderdale on either Saturday or Sunday; November 13 and 14. By dusk on the 14th only Peter Sutro of Patmar was unaccounted for, and he would show up at the end of the first full day; Monday. Recognizing that none of the attendees had been into the Turks and Caicos previously, and that the host hotel was directly on a magnificent white, sandy, virgin beach, we set aside the first day for 'getting acquainted' activities. That was the day that about a third of the group learned how to Scuba dive, or if they already knew, took a refresher course. That was the day Jan Spisar created the first **Turks and Caicos Navy**, commanding a seven foot rowboat and setting out to patrol the northshore reef. Later in the day Spisar would get his 'Naval Patrol Boat' broadside to the seven foot surf coming over the reef, capsize, and end up **towing** the boat (!), the contents and a spear gun back to shore more than two miles. Along the way he **stopped** long enough to spear a Grouper which the cook at the hotel presented for dinner!

Monday was also the day that about a third of the group would be stranded on the **wrong side** of the reef, and spend three very uncomfortable hours awaiting rescue. And **David McClaskey** learned to master a three wheel sandy-beach-riding machine and send Morse (or McClaskey) code with his T shirt.

Several of the attendees brought equipment with them to be tested and evaluated. **David Johnson** of **Paradigm Manufacturing**, the producer of the Paracipse 12 foot antenna, and **Tom Limpicke** of **Satellite Innovations** (12 foot fiberglass antenna) were anxious to learn how their respective antennas measured up against the many Provo test antennas already in and operating. A crew that included Limpicke, **Guy Davis**, Dave McClaskey and **Rich Potts** of **Tel VI** got the Satellite Innovations 12 foot dish flying on Sunday. How well did it work? Pictures were directly comparable with a test ADM 13 footer on premises.



JAN SPISAR protected the island of Provo against any foreign invaders for five full days, routinely patrolling the reef with a seven foot rowboat. These three invaders learned not to mess with him! (Jan generously shared his lobster with the rest of us for lunch.)



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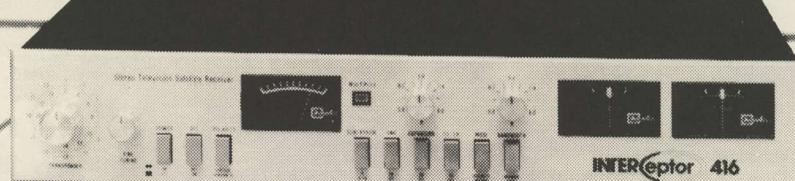
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**Peter Sutro** had arranged for a Harris 10 foot Delta Gain antenna to be on Provo, and tests during the week long Retreat revealed it had exceptionally good performance . . . for a ten foot antenna. Hard Carrier To Noise Ratio tests came later, but it had the apparent performance of either the Satellite Innovations 12 footer, or the ADM 13 footer, on the low look angle F3R signals (look angle of 20 degrees).

It would be later in the week that David Johnson from Paradigm, **Bill Miller** from Promar and **Roy Orvis** from Dryden, Ontario found sufficient time to fire up the Paraclipse 12 foot antenna. All heads would turn when it became apparent that the Paraclipse had exceptional performance. Minutes after firing up the antenna in the bright sunlight, on a small monitor, Johnson and Coop went inside to compare the visual pictures seen with a pair of other antennas pointed at the same F3R satellite. On purpose, they had done their initial checking on F3R, transponders 6 and 14 since these two represented some of the weaker F3R signals in this portion of the Caribbean.

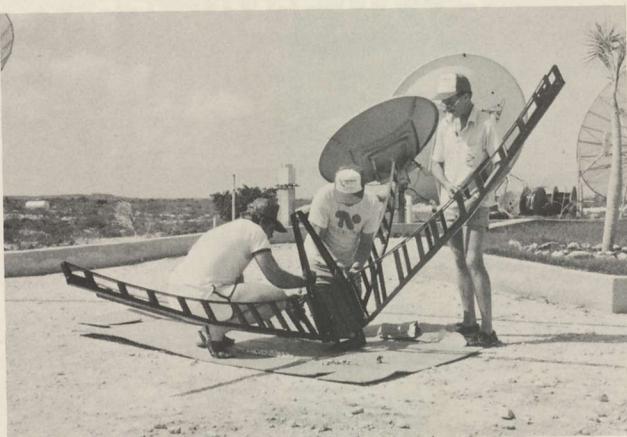
Standing inside the WIV control room, Coop asked Johnson to compare his own Paraclipse WTBS pictures with those showing on a monitor. "I think mine are better" he responded. They were, by at least a full dB CNR. Coop pushed some buttons and the same WTBS picture again appeared on a second monitor. "Now, of the three, which is the better picture?" he asked Johnson. David hesitated a second, and then again responded "My own pictures".

At this point several others in attendance agreed with Johnson. The question, obvious to all, since there were so many antennas feeding into the building, was "Which two antennas, showing WTBS, is the Paraclipse better than ???".



We'll save the answer for a little later in the report. Suffice to say both antennas which the Paraclipse was out performing on F3R would turn out to be substantially larger antennas.

Not all of the 'fun and games' was played in the antenna field. Intersat brought down four of their latest version receivers and gave a hard workout against all comers. One of the four got an especially severe treatment. McClaskey decided that he wanted to subject it to the 'ultimate salt spray test' and arranged with Rich Potts, Guy Davis and some local divers to take the satellite receiver to the bottom of the ocean (!) where they tried to photograph it buried amongst the coral formations. McClaskey's idea of a great advertisement was the receiver at the bottom of the ocean, photographed with large Barracuda and Grouper fish chomping on its innards. We recorded the event on videotape and film and suspect that most of you will tire of both the tape (to be shown at the next STTI event in Las Vegas and probably every opportunity Intersat has in the interim) and the advertisements long before McClaskey does! The receiver was separated from its simulated wood top, and laid on the beach for photography. The ocean cooperated and the receiver was shortly dripping from the sea water. It remained half in and half out of the water for ten minutes and then it was taken to the briny deep by Guy Davis and a diving crew. After nearly an hour of trying to make the receiver stay down (it kept wanting to float back to the surface!) and several rolls of film, the receiver came back ashore where it was thoroughly doused in fresh



JOHNSON, ORVIS AND MILLER put together the Paraclipse 12 foot antenna in the warm winter sun.

water. Then McClaskey and wife Sue went to work drying it our with a portable hair dryer. Several hours later, at the WIV control room, a nervous Davis and McClaskey connected up the deep-sea receiver and as several of us held our breath, applied power. There was instant picture. Not a great picture, you understand, but instant picture. The receiver had survived this foolish test!

#### Only on Provo.

During the course of the week we met for several 'Retreat Session' hours every day, sitting in a circle discussing in open forum a long list of topics. We'll look at some of the highlights of those 'round-tableless' sessions shortly. With everyone relaxed, at ease and on a close retreat basis, the conversations were among the most productive most of us had ever participated in. On three of the evenings, local (Turks and Caicos) speakers met with us for dinner, and then addressed us after the evening meal. Those on hand for this series of getting acquainted sessions included the **Chief Minister** (the nation's elected leader) who told everyone how pleased the government was to have the group on hand, and then he outlined why a smart thinking business executive would carefully study establishing an offshore manufacturing facility in the islands. When he got to the part about 'no taxes, ever' there was wild applause.

#### Antennas

There was long, serious discussion about antennas and feeds. Jan Spisar took the position that nobody had ever really proven that it was impossible to obtain more than 78% efficiency from an antenna; it was only that those who have tried have failed in the past. Spisar felt that while 100% efficiency was probably impossible, something better than 78% efficiency (best case, claimed, with a carefully shaped



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Cassegrain type feed) was probably obtainable. Most agreed that present antennas were terribly over-hyped and that many of those selling well were moving in the marketplace because of slick promotion and not because they were better collectors of microwave electrons. Peter Sutro argued that the Harris Delta Gain was more than simply a slick promotion, and based upon tests that had been completed on Provo with the test antenna he shipped down, we were inclined to agree. However, since the measured numbers did not equate to **some** of the Harris claims, Peter agreed that perhaps they had overstated their case initially.

Surface accuracy of the dish was attacked from several fronts. There was concern that big surfaces were not giving big surface performance. **There was genuine puzzlement when the 12 foot Paraclipse outperformed not only a 16 foot (\$12,000!) AFC/Microdyne dish which has been the mainstay WIV antenna for over two years, but also outdid the original Hero 20 foot surface that was rescreened and re-proofed (with improved performance noted) this past summer.** Of the five antennas installed and operating at the WIV Grace Bay facility, only the 20 foot (new **this** year) Hero antenna was better. Paraclipse/Paradigm President David Johnson was obviously delighted with the results and the orders for antennas which resulted from the Retreat testing sessions. We'll have a **detailed** look at the Paraclipse in an early issue.

The consensus on antennas was that while there continue to be less and less expensive antennas on the market, there seems to have been a slow backwards slide in antenna performance. The improved EIRP contours from the latest F3R, W4 and W5 satellites have 'hidden' or 'masked' the inefficiency of many of the **latest** antennas; more dBs coming from the sky have covered up that fewer dBs are coming out of the antennas.

The postulation that having one, almost universal feed system (the Chaparral) may not be in the best interests of the industry was also floated. With Chaparral capturing as much as 75% of the feed marketplace, and with the relatively broad f/D range which the Chaparral will function with, the question was raised by Coop and Spisar as to whether or not many of the antenna designers may be taking 'the easy way out' and simply adopting the Chaparral feed for their own antennas, rather than sitting down and designing an **optimized** feed (themselves, or with a consultant) for their particular f/D. Spisar continued on his suggestion that a truly optimized antenna system could create more gain and antenna efficiency, thereby resulting in improved **small** antenna system performance.

#### LNA's

The Retreat group discussed what had happened to the forecast, made in early 1982, that the LNC marketplace would grow and the LNA marketplace would diminish during this just passed year. That there are considerable overstocks of LNC type packages in distributor warehouses from coast to coast seemed genuine. That LNAs continued to move with good speed, and that stocking depths on LNAs was not all that good (inspite of lowered prices) also seemed genuine.

Most felt that the LNC packages were simply too constrictive for the dealers who wanted to be able to step a customer up to a more complex or higher dollar demodulator package. The LNC packages



**EQUIPMENT TO TEST** was scattered all over the WIV control room. It took us a week to get all of our patch cables back in place and the room returned to its original 'cluttered' look!

available almost have to work directly with their **intended** demodulator unit, and when a dealer sells an LNC package he will have to go back and step the customer up with both a new indoor receiver (demodulator) **and** an outdoor (matching) LNC at a later date. This was also the case with two piece (outdoor downconverter plus indoor demodulator) packages of course; but the LNC was at least separate and the customer could keep it, or step it up, separately without being forced to do so.

Several reported that they expected further drops in LNA pricing during 1983 but nobody was willing to suggest how low the LNAs might fall before the end of the year. Intersat reported on a recently negotiated 10,000 piece buy it had made with **LOCOM** and there was a lively discussion about the true nature of modern day noise figures/temperatures with LNAs. Coop reported on the excellent results he was having with an **80 degree LOCUM unit** he installed immediately after returning from the Atlanta STTI show and most agreed that LOCUM, as a new young company that will have to prove itself against stiff competition, could well be a firm to watch with care during the new year.

The consensus was that LNA failure rates, high in recent years, are a thing of the past now. And LNA suppliers are **now** extremely competitive to the larger distributors, resulting in a constant lowering of prices for LNAs, especially in the 100 and 120 degree class.

#### Scrambling

A full session was devoted to scrambling, and with some first hand input from attendees who have been involved with the ill-fated Canadian CANCOM system to chew on, it became apparent that while there was much to talk about, not a great deal could be forecast with certainty until more was known about the generic nature of the HBO (et al) scrambling system to be adopted.

It was common knowledge that all of the major premium service programmers on F3R were, indeed, expecting to utilize the **same basic scrambling system**. It was also common belief that the system would first appear, perhaps as early as June, on one of the time-zoned transponders for HBO.

All agreed that when scrambling first became a fact of life, there would probably be a giant hiccup in the industry. It was pointed out that virtually every known scrambling system had to have an unclamped (unfiltered) baseband video output from the receiver to function. That a descrambler had to see 'raw video' if it was going to recreate a video signal from the scrambled transmission. **Many** of the cable receivers, and **most** of the non-cable receivers now in use, do **not** have such an output. That suggested that any cable programming going to a scrambled transmission system, assuming the system followed past scrambling approaches, was going to have to somehow allow for the individual cable system users getting inside of their receivers and bringing out of the receiver a special unclamped video output; if they were going to hook up the incoming scrambled video to a premium supplier 'supplied' descrambler unit.





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That hiccup in the cable industry aside, and the resolve that all new receivers should be equipped with an unfiltered video output (no clamping), the various techniques which might be employed were discussed at length. The consensus was that if a system such as the Oak Orion was universally adopted, there would be a long, unpleasant period not unlike that currently underway in Canada, during which scrambling would be on, and off, for days and weeks and months at a time while the hardware problems were sorted out. That CANCOM and Oak might not ever straighten out their present problems was considered a distinct possibility.

If the system adopted turned out to be far better in the field than the Orion, it was determined that no matter how good it was, there were going to be individual problems with individual cable firms. The number of descramblers required, someone estimated, just to service the existing cable firms and hotels taking HBO (et al) on a licensed basis was calculated to be in the region of 8,000 units. To keep anything approaching 90% of those units operating, or to get anything approaching 90% operational at any given point in time seemed like quite a chore. One knowledgeable source suggested that CANCOM was doing well to break the 50% mark (number of authorized receive sites times number of authorized receive channels) at any one time. Other non-scrambler but scrambling system related problems, such as CANCOM's problems with their addressable computer interface at the uplink, only magnified the problem.

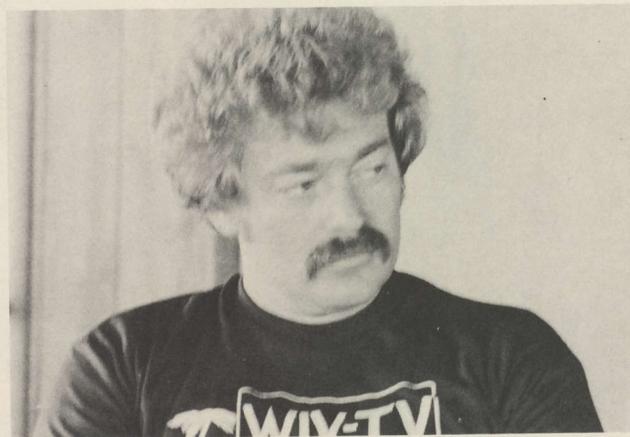
It was suggested that during this 'burning in' period, the marketing problems facing the industry would or could be far greater than if they whole premium cable service industry simply awoke one morning, turned on their scramblers, and everything worked just fine. With no problems.

"I consider the scrambling a logical step they must take," offered one attendee. "Since it is going to happen, we are far better off if they make it work and work well as soon as possible. Then we can move into our own posture of negotiating with them and either getting permission to be users of individual descramblers, or move on to rebuilding our marketplace without any premium service signals".

That the scrambling will experience problems, that it will be on for awhile, and off for awhile (as in Canada), seemed certain. "This will confuse the marketplace. Everytime a service that is scrambled for awhile stops scrambling, fresh, new rumors will start that they are abandoning scrambling. This will happen over and over and over again and each time it does we will have a peak, followed by a valley, in our marketing programs. We could adjust far better, with fewer problems, if it simply worked 100% from the time it starts".

How would those present deal with the sure-to-come hardware that is designed to unscramble the signals without program supplier permission?

"It is a little bit like the tremendously over hyped Zenith tiered system that we see in use in some of the new cable systems" one remarked. "Here they have this fantastic box that is filled with ICs and logic. They tell you that it cannot be tampered with by any-



GUY DAVIS/ St. Louis, Mo.

one, that it will only descramble when it is told to descramble by an address that comes with the inwardbound signal. But inside is a programmed device which if you remove from the socket position on the board, and short together a couple of pins, you can totally defeat the addressing function. It is almost as if somebody was locked in a room and told that he would only get bread and water until he passed through the door a tamper proof addressable scrambling/descrambler system. This guy worked for months and months on it, and after getting the circuit all worked out and the custom ICs created, he went back and spat on his captors for feeding him bread and water. He built into the system a simple two-pin interconnect that totally defeated the whole box!"

Coop suggested that perhaps the new system would go for 'soft video scrambling', a system that could indeed be defeated by a half bright engineer. But, to back that up, the audio would come out in digital format with a constantly changing audio addressing code. "We know that hard video scrambling always does nasty things to the video" he noted. "Nobody has yet shown in public a system that works well, does not degrade the video passing through it, at a reasonable price. All the ones that meet this criteria cost an arm and a leg".

"But digitized audio is quite another technology. It is not as sensitive to degradation, it has far more codes that can be employed, and it is far easier to handle." The consensus here was that if the new, secret system yet to be shown in public took the 'soft video scrambling' and 'hard audio scrambling' approach, there would probably be far fewer successful attempts to bust the scrambling system. There was also a consensus that if that came to pass, the industry might actually be far better off since there would not be a lot of wasted time spent trying to break the system for underground, bootlegged 'black boxes', and the industry could then either negotiate a fair settlement with the reluctant-to-date premium service suppliers, or write off premium services as one of the advantages to owning a home TVRO.

How would those present handle the appearance in the marketplace of black boxes that did break the security codes? After discussion, it was the agreement that as long as the premium service suppliers refused to even talk about licensing (authorizing) individual homes to use their signals, there would be a huge, and growing market for the boxes. "On the other hand, if the boxes work, but the premium service suppliers are willing to then license us for home use at a fair rate, then we would be foolish as an industry to promote the sale or 'black boxes', or participate in their distribution".

The question of what might be a fair rate came up.

"Suppose" suggested Coop "that HBO announced they would sell or lease an authorized descrambler for their service for the same fee it was costing them to provide them to the cable firms? And suppose that turns out to be \$1500 for the box plus say \$5 per month for the service? Is that a fair rate?"



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The group thought not, but decided that if HBO was really paying \$1500 for a box, for a cable system, and they offered it for that price to individual homes (plus a monthly service charge for the service itself) that this would be yet another hurdle to overcome. "That would certainly make HBO look good to Congress" one suggested "even though it would not help the retailers of home terminals very much".

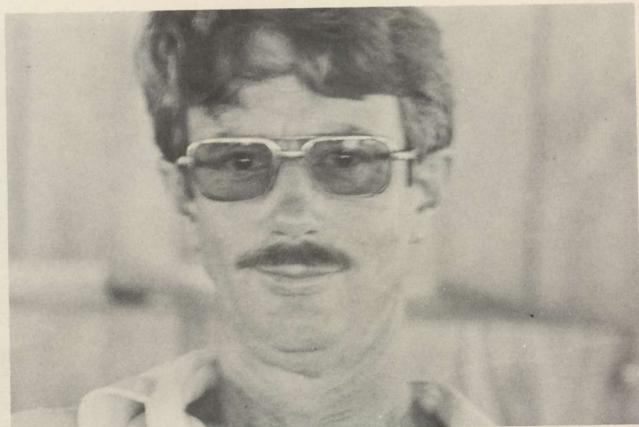
Another suggested that if HBO actually paid \$1500 per descrambler, and took it four or five such descramblers per home to get the same premium services as are now available, that this would have the same effect as HBO (et al) simply denying authorized service to individual homes. "We know, without even knowing what the system consists of, that if HBO is buying the units for \$1500 that they can really be built in the kind of quantity which the private terminal industry would demand for closer to \$50. Volume is the answer here and if HBO is not willing to address this as a price sensitive/volume conscious problem, then somebody else will do it for them".

Walking away from the heated and sometimes confusing discussion on scrambling, the general attitude was that regardless of how the details sort themselves out during 1983, the marketplace for home terminals is going to be far more confused during the year coming up than at any time in the past. "The smart guy is going to be looking at other, optional, market opportunities" one observed.

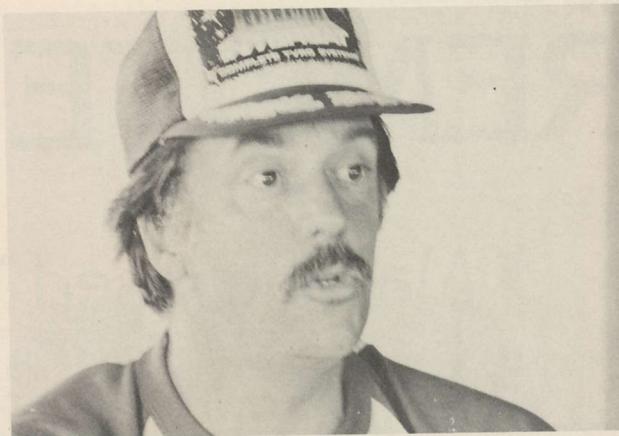
**Alternate markets.** An entire session was devoted to exploring what types of services are now available on satellite, which might appeal to yet untapped markets out there in North America. There are several data, stock quotation, commodity and specialized services available and many of these present (McClaskey, Davis, Potts, Sutro, Harrington) had attempted to work with these 'premium-business-service' suppliers. The consensus was that to company, they were paranoid about private, home or small business terminal users. "They seem convinced that we are nothing but pirates who would steal the gold from our dying grandmother's teeth" one observed. "We have tried and tried to work with them, to get them to educate us on how we can help them sell their services by turning our own distributors and dealers onto what they have to offer. They are paranoid about somebody taking the top off of their boxes and copying their circuits!" noted Tom Harrington.

The problems here, which must be resolved before the industry can do business with those who offer highly specialized business data and commodity services to customers, seem to revolve around industry image. Three of the group volunteered to go as an ad hoc committee of three to visit some of those firms supplying this data via satellite, to explain the serious, business like nature of the present day private terminal industry, and to attempt to bridge the gap between the old and tired piracy issue of the olden days and the modern, mass distributed consumer and small business oriented industry of today.

"When the scrambling hiccup occurs, we need to be ready with an aggressive marketing program for small business terminals"



BILL MILLER/ Tampa, Fl.



DAVE McCLASKEY/ St. Louis, Mo.

noted one attendee. "I think this is a bigger problem than one supplier can handle; we, as an industry, need to focus our attention on the objections these people now have to even talking to us, not to mention doing business through us or with us, and then working our practical solutions to their fears and problems". Peter Sutro and Cooper made a special trip into New York City early in December to meet with the people at Reuters; the first step towards getting some meaningful business dialogue going between those who supply business oriented data (Reuter's occupies transponder 18, on F3R, weekday daytime) and our industry.

**Alternate markets.** While the group was on Provo, each had the opportunity to see the reception from the various Intelsat satellites on the twenty foot 1982 version of the Hero antenna. That at least some of these services could be widely received with good home quality service on quality 12-13-15 foot dishes throughout much of the Caribbean and South America did not escape notice (see separate report in this issue of CSD). Bill Miller of Promar, a firm selling terminals outside of the USA, was especially interested in the difference in performance between the Hero (82 version) twenty foot antenna and the recently installed ADM 20 footer. The two antennas are not at the same location, and in all fairness to both, while they are not but a couple of miles apart (the new ADM is installed at the soon to be completed WIV 'tower site' from which all three of the WIV television service channels will soon radiate), the equipment installed on either for testing is not done so that both can be directly compared at the exact same point in time.

Tests completed by Andy Hatfield, and subsequently reconfirmed by Humphries and Cooper, indicated that the ADM averaged between 1.0 and 1.5 dB better carrier to noise ratio than the Hero 20 footer; across the domestic satellite belt from F4 down to F3R. The ADM motor drive did not allow it to be driven towards the eastern sky and the Intelsat belt, so no cross checks could be performed on those birds. The 1.25 dB average improvement in CNR does not seem like a great deal, but for several of the 'marginal' signals that ride barely below threshold from F3R and other birds in the Turks and Caicos, this additional signal from the ADM brought important signals up to full above-threshold quieting, and eliminated the last of the 'sparkle hits' that lingered even on the massive Hero 20 foot antenna.

That the off-shore market was starting to amount to something, and further that the off-shore market might well see marked reduction in installed terminal pricing during 1983 was a central theme of discussion. "Competition in the Caribbean is going to get very keen during 1983" predicted Peter Sutro. "We have barely scratched the surface with private terminals there". What impressed Sutro the most about what he saw on Provo? "The Parclipse 12 foot antenna was exciting; to see those kind of pictures on an antenna that knocks down into a small package, that can be shipped or carried in a small airplane, and that sells to us for so few dollars, has really opened my eyes".

The European and African market puzzled many. "We don't know enough about it to really understand what it will take to sell

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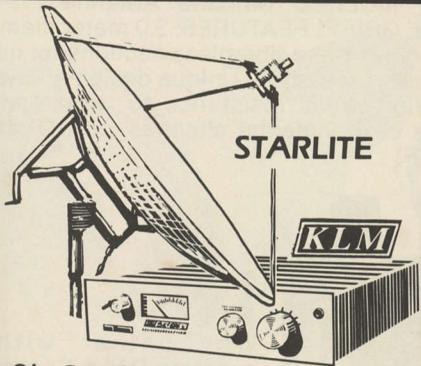


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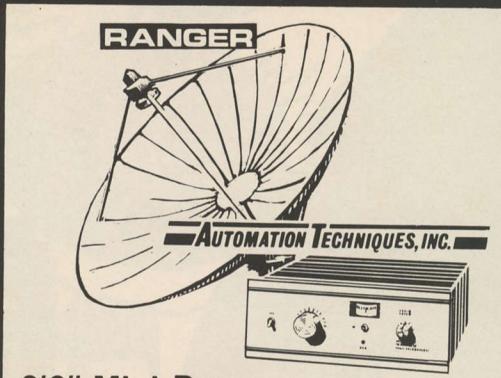
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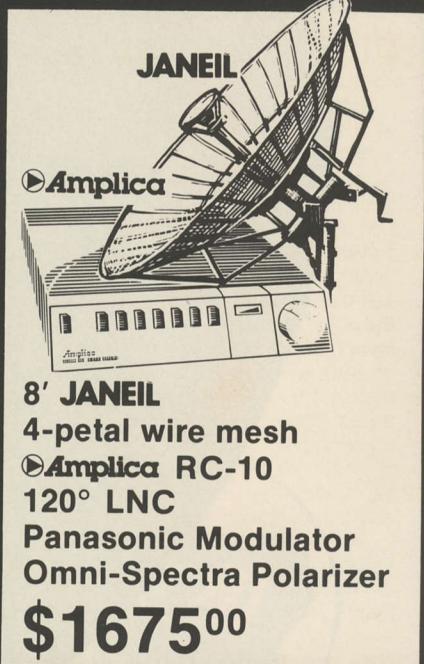
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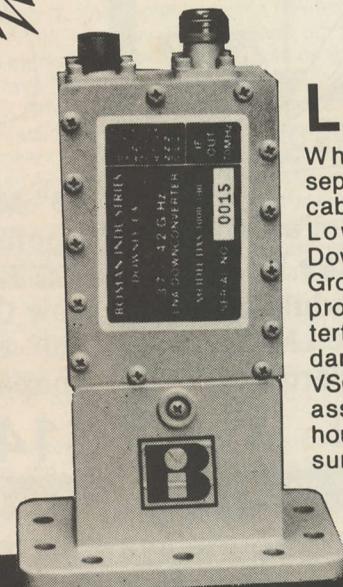
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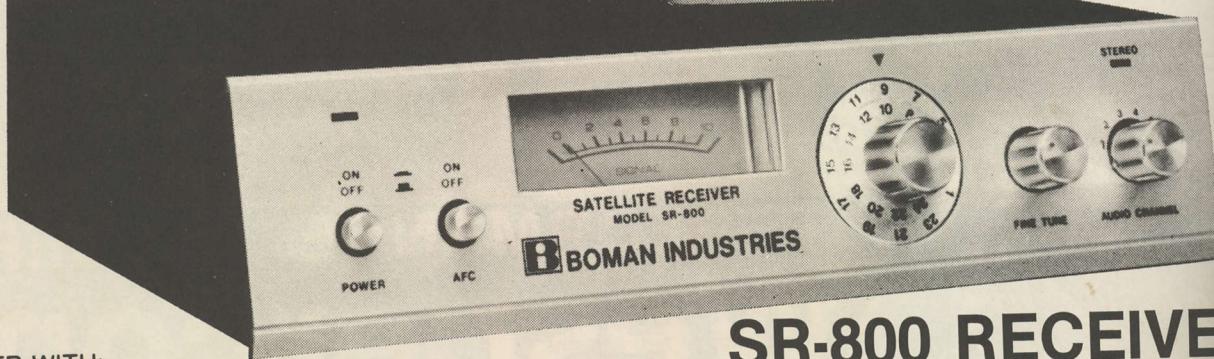
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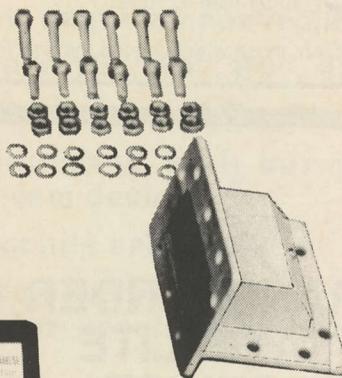
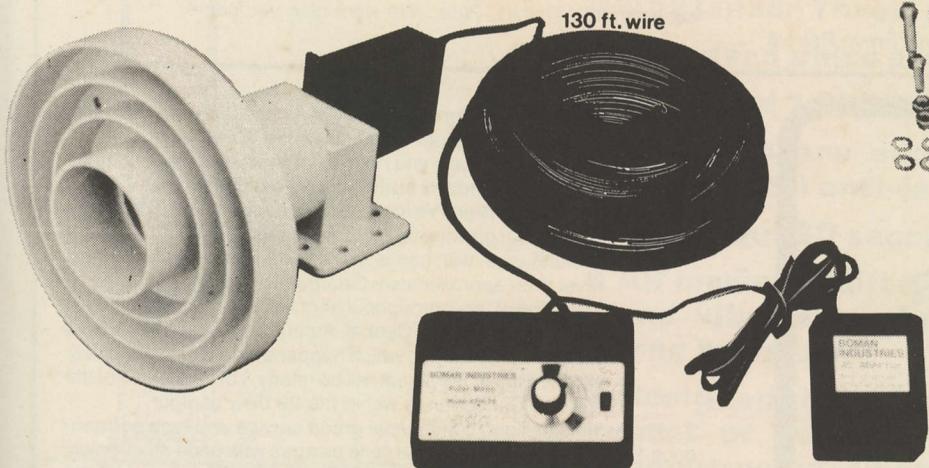
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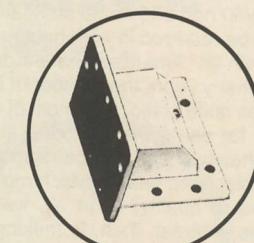
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there" one offered. Another said "I would like to take a 'certain 12 footer' in there, now that I have seen it play here, and see what could be done with some of the stronger Intelsat signals. There is no reason, if the Venezuela signal from 27.5 west or the Brasilian signals from 21.5 west are noise free here in the Turks and Caicos on a 12 footer, why Saudi and some of the other signals that cover Africa and the Middle East with comparable beams and powers should not also be at or above threshold. I think we are going to see an entire new industry develop here; one based upon rugged but lightweight, high performance antennas and feeds, designed from the ground up for quick importation and quick installation in far away places". Another said "Twenty foot antennas are fine and they are profitable to install, if you have that special expertise to deal with getting them to a distant location, putting them together when you get there, and making them play under difficult conditions. But think how much bigger the market would be if we could get adequate results (if not the same) with say an optimized fourteen footer that could travel as excess baggage. That would really turn this whole thing around and quicken the pace of the development of the international marketplace". Paradigm's David Johnson listened carefully, and began sketching on a larger-than-12 footer.

#### When Again?

With one exception, those who attended the first 'Provo Retreat'

said they wanted to come back. A few of those have already made plans to come back to Provo during the winter months; without a Retreat to lure them here.

The size of the group, smaller than hoped for, turned out to be both a blessing and a definite 'plus'. Everyone got to know everyone else, and in a week's time there developed a tremendous spirit of shared experiences and interests. The combination of 'beach life', plenty of recreation, total sunshine and an island that still has plenty of pioneering spirit of its own, plus a free rein to snoop and play with all of the equipment at the various WIV sites, proved irresistible. Will it happen again?

If everyone who said they would return in the fall of 83 came back, there would only be room for a couple of additional, new people. That suggests that perhaps the Provo Retreat concept needs to be repeated twice per year, once in the late spring and once in the mid-fall. This would allow not 15, but 30 people to participate overall, each year. If the sheer demand to attend grew beyond the 15 per Retreat suggested limit, some additional steps would have to be taken to make room for those who insisted on participating.

Peter Sutro. "I planned to go home early Friday. There was no way I could leave before it was over. I never learned so much, so painlessly, in such a short time in all of my life. It was a wonderful experience". Thanks, Peter. We were glad you came.

## HALF TRANSPONDER SATELLITE SERVICE

#### GAME PLAN

Quietly, without much fanfare there is developing an extensive network of TVROs throughout South America using various Intelsat birds to interconnect national television networks with regional and local television transmitters. At the present time there is regular Intelsat service from Mexico (four transponders), Colombia (one transponder), Peru (one transponder), Brazil (three transponders), Argentina (one transponder) and Venezuela (one transponder). Not all of these services are operating in the familiar (North American) NTSC/525 line/60 hertz/30 frame standard but even those that are different can still be received in high quality black and white and usually good audio with an 'American Standards' receiver.

For many years the number of Intelsat relayed domestic services has been quite static. And most of the domestic services relayed are from or for countries located in and close to the African continent. Unfortunately, those services are largely transmitted on Intelsat 'eastern' hemispheric beams which means that they cannot be seen with any kind of quality, or at all, west of their geostationary satellite locations. Interest, then, in making use of these services has been scant at best since it has only been during the past six months or so that any private terminals have been operational in Africa proper.

The several year old Brazilian service aside, virtually all of the other now available Intelsat service has come on line during the past six months. Some of this new service is operating from an Intelsat V series bird which means that as a minimum the field users are experiencing signals that are 3 dB hotter than older series birds (and in some cases 6 dB or so hotter due to ailing transponders on older series birds).

Before you can consider selling service (in the form of a private or commercial terminal in South America or the Caribbean), that includes use of these services, you need to know a little bit about them.

#### 1) NTSC color standard audio in sub-carrier format

A) Venezuela (VeneVision), service approximately 12 hours per day but growing as more terminals come on line. Spanish language, with hemispheric pattern, signal is at 29 dBw level from approximately Georgetown (Guyana) across to Lima (Peru), and throughout all of South America northwest of that line through Central America as far northwest as Mexico. At boresight, which happens to fall between Havana and Miami, the signal will be nearly 3 dB hotter. All of the eastern Caribbean is within the 29 dBw contour.

This is an excellent, commercial grade service and high performance 12 footers will deliver home style pictures with good electronics. A 26 dBw contour covers virtually all of South America, except for the far southern tip, and the eastern third of Brazil. 20 foot antennas will provide high quality service in all but those two defined areas.

#### 2) NTSC color, non-standard audio

A) Peru (RTP) service approximately 12 hours per day. Service does not carry audio on same transponder as video, rather it ships audio on a transponder higher up in the band (see separate chart here). Service levels are from 6 to 7 dB weaker than Venezuela, producing watchable but not high quality video (in color) on a 20 foot terminal.

B) Colombia service approximately 10 hours per day. Service uses many American programs, dubbed into Spanish and has reasonably high quality production values. However, audio is shipped on a transponder higher in the band. Service levels approximate those for Peru.

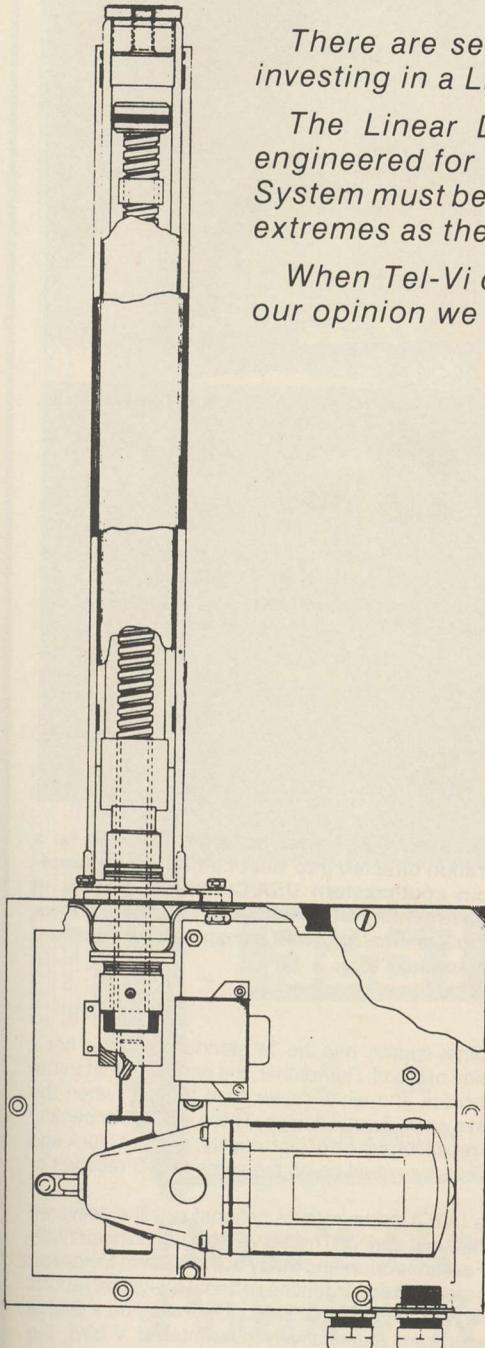
It would appear that the Peruvian and Colombian (national) services are designated for use only by 13 meter or larger receive terminals, and that neither service is attempting to serve typical low power broadcast stations in their respective rural areas. Their technical format is similar to that employed by several of the African nations and while little is known about the Peruvian system in use, Colombia is currently 'out to bid' for a fairly large quantity of 6 to 11 meter sized terminals indicating that they plan to utilize a different transponder/beam configuration than that presently in use. The primary user of the Colombian system at present is a television broadcast station on the island of San Andros, Colombian owned, in the far southwestern Caribbean.

#### 3) NON-NTSC Color, standard audio in sub-carrier format

A) Brazil (Rede Globo) has recently expanded to a total of three channels of service, although reception on a NTSC receiver is in black and white because of the unique (to

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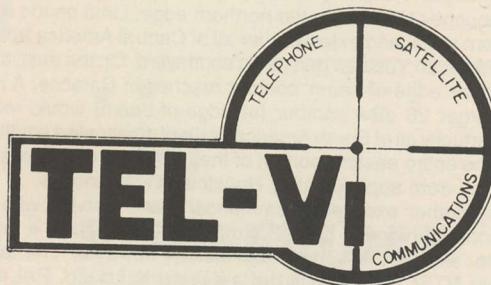
### SPECIFICATIONS

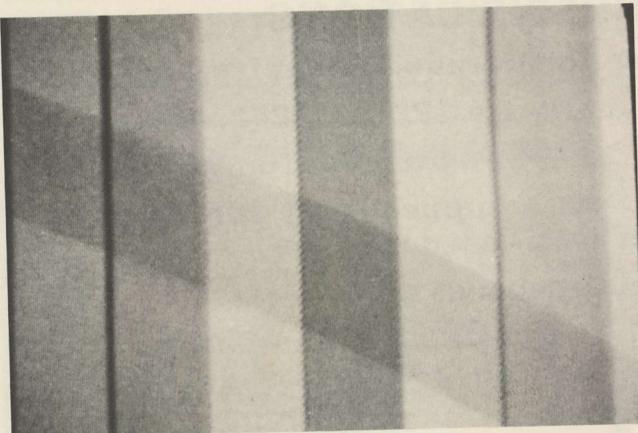
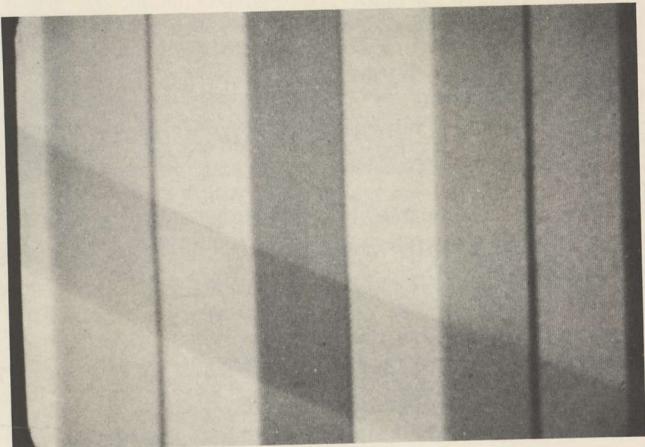
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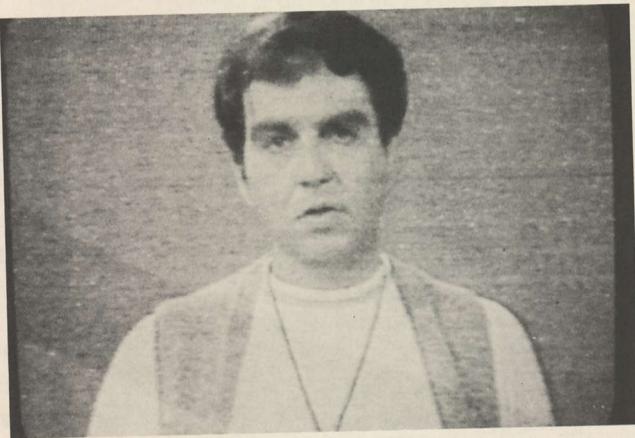
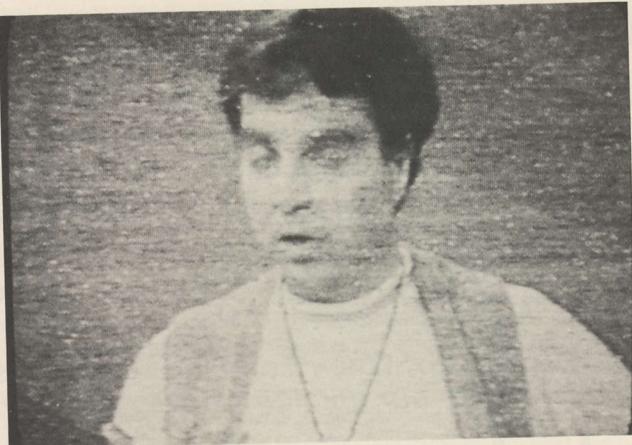




VENEZUELA'S VENEVISION (VV) operates from 27.5 west on an apparent hemispheric pattern. This Intelsat V bird service is extremely potent throughout the Caribbean and much of South and Central America. Top photo shows reception on a 20 foot terminal with half transponder IF; bottom photo is of full transponder IF. Signal is so strong that selection of IF bandwidth makes little difference in apparent signal to noise ratio.

Brazil) PAL-M standard. This is a 525 line picture, like NTSC, but the color sub-carrier frequency (for the base-band signal) is carried at a frequency higher than the normal NTSC 3.58 MHz. This means a standard US receiver will produce black and white rather than color pictures. Language on all Brazilian feeds is Portuguese, which is also unique (within South America) to Brazil. Service is 14 to 18 hours per day on the two primary (and stronger) transponders, while the third transponder is largely used for news feeds (see separate chart here). EIRP levels from this Intelsat IVA family bird approach 29 dBw for a circle that touches Havana on the northern edge, Lima on the southern edge, and extends over all of Central America from the Mexican Yucatan peninsula southward. On the east, the 29 dBw 'edge-of-beam' contour reaches to Caracas. A much larger 26 dBw contour (at edge-of-beam) would include virtually all of South America north of 40 degrees south, and the entire eastern portion of the USA for a region east of a line from approximately Houston to Minneapolis.

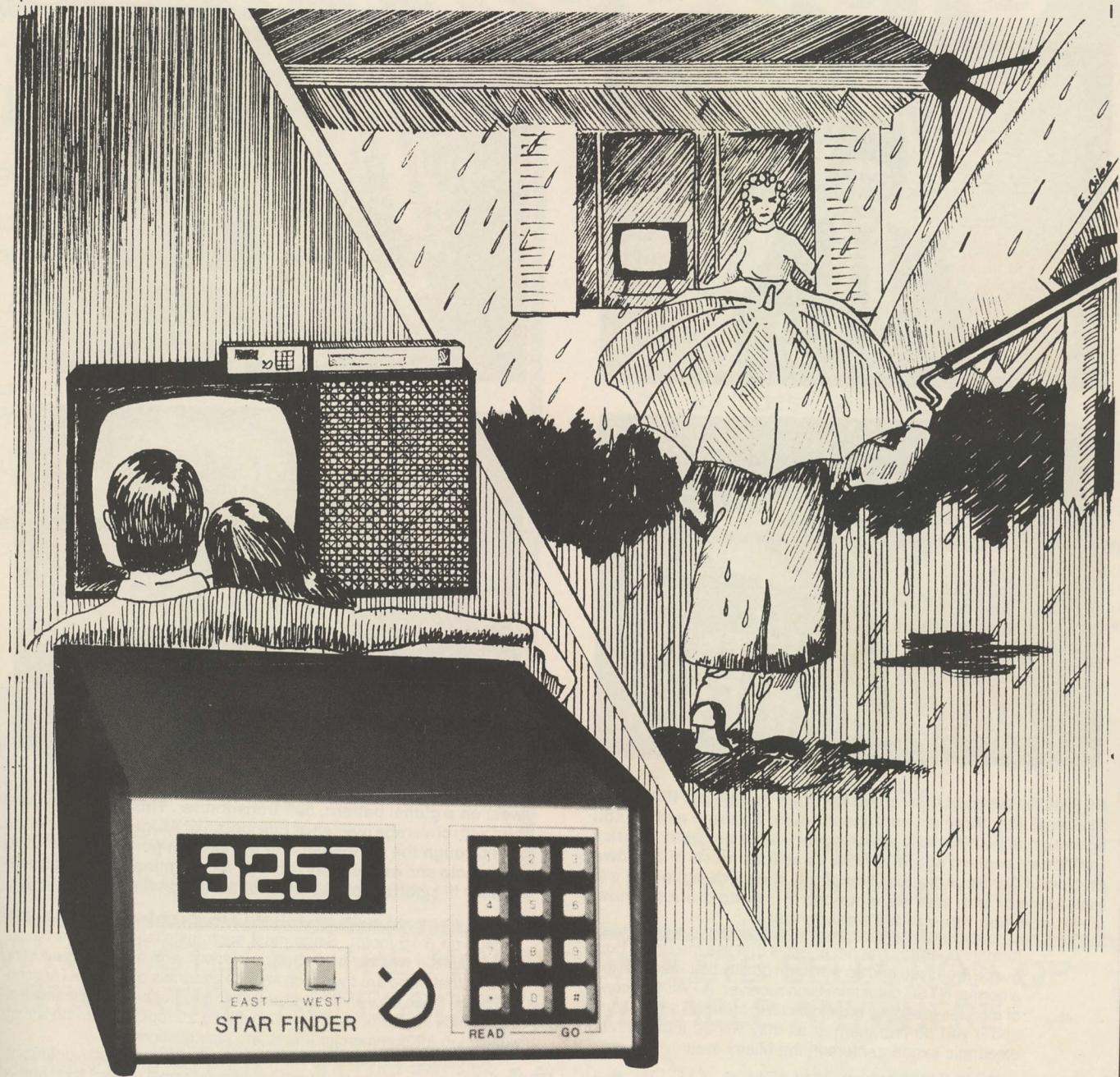
This is another excellent, commercial grade service with high program content integrity. The (Portuguese) language is a definite deterrent to 'selling' the service universally, however. The lack of color, on an NTSC receiver, is not a severe handicap. PAL-M receivers (VHF tuning) show up on occasion in the South Florida marketplace but no regular source is known. PAL-M monitors are slightly easier to find, in the South Florida video market but because they only



PERU'S RTP operates from 27.5 west on what may well be a spotbeam configuration directed into west-central South America. Reception from southeastern USA/Caribbean suffers in some comparison to Argentina and Venezuela. Top photo shows reception on a 20 foot terminal with half transponder IF; bottom photo is of full transponder IF.

work in Brazil (no other country has the 'M' standard) there is not a plentiful supply outside of Brazil. Remember, the penalty is that transmissions appear in black and white rather than in color when the receiver does not have an 'M' format design. There is no other penalty and black and white reception will be of high quality, just as a black and white NTSC format service would be on the same NTSC receiver or monitor.

B) Argentina (ATC) inaugurated a national satellite delivered service this past spring. The service began coincidentally with the Falklands crisis and many of the US and European networks taped direct Argentine national television reports of the crisis directly off of this feed. Operating on a Global transponder from the relatively new Intelsat V bird, the signal is exceedingly well received with surprisingly strength over most of Europe, Africa, South America and along the eastern seaboard of the United States. The edge-of-beam EIRP should be around 24 dBw while center of beam could approach 26.5 dBw. The audio is transmitted as a standard audio sub-carrier (see chart here) and the language is Spanish. The programming is a mixture of local, European with Spanish dubbing and some three to ten year old American series. The only negative against this typically 12 hour per day service is that Argentina transmits in something called PAL-N, which is a variation of the basic European PAL B format. PAL-N is 625 line, but 6 MHz rather than 7 MHz wide as the other more widely used PAL



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BRASIL'S REDE GLOBO operates from an Intelsat IVA bird at 21.5 west with three active transponders. Transmit pattern configuration is hemispheric which covers most of South America, Caribbean, eastern shore of USA as well as much of the lower portion of Central America. Top photo shows reception on a 20 foot terminal with half transponder IF; bottom photo shows same reception through full transponder IF.

formats operate. The net effect is that like the Brazil Portuguese feed, you end up with high quality black and white on a normal NTSC color television receiver. A PAL-N receiver, or monitor, is slightly more difficult to find than a PAL-M unit, and if you do find them at all they will be found through electronic export centers in the Miami area.

#### **Understanding The Market**

Argentina, Venezuela and Brazil do good to excellent jobs with their coverage of news and sports. Argentina and Brazil in particular are very big on sporting coverage, and they often are fed directly from Europe or elsewhere in South America with soccer and other events. Venezuela comes closest with its strong NTSC, standard format signal to being **like** American television, with a mixture of soaps (novellas), series, regular weekly sitcoms, sports and news.

There are large, unserved regions of South America where local service is either a single local channel or **no channel at all**. In situations like this, a terminal that produced these four channels (Brazil for a pair, Venezuela and Argentina for one each) would be quite a saleable product; even, perhaps, if the Brazilian service channels are in Portuguese.

Where the majority of the television, or all of the television, is state controlled or operated (if terminals could be imported) merely adding a second or third 'program choice' would be very saleable.

With the advent of the IVA and the V series satellites, in use for the services named, some very substantial service contours result. The 29 dBW contour for VeneVision, for example, translates to home level



ARGENTINE TELEVISORA COLOR (ATC) operates from 27.5 west on a global pattern, half transponder. This is an Intelsat V bird with coverage over all of Europe, all of Africa, South America and through the Caribbean into the eastern portion of the USA. Top photo shows reception on a 20 foot terminal with half transponder IF; bottom photo is of full transponder IF.

service on a good performing 12 or 13 footer and commercial quality service on a 15 footer. Since most such installations would be designed for the **weaker of** the levels present, and from the preceding we see that there are four such service channels of interest (Argentina, Brazil times two, and Venezuela), a 15 footer would be a satisfactory choice for home level service while a 20 footer would do a high quality job for commercial (hotel, etc.) installations.

Remember that all Intelsat transmissions are circular polarized. This means that if you look for them with a normal (linear) feed probe, your LNA probe will only see 1/2 of the available signal. This has the effect of reducing your apparent 'footprint' from say 29 dBW on VeneVision to 26 dBW. There is a low cost way of getting the linear feed that you find with, say, a Chaparral feed plus LNA to a circular feed. England's Steve Birkill describes such a system, which first appeared in CSD in September of 1981, in his **'International Satellite Television Reception Handbook'**.

#### **Half VS Full Transponders**

Just as a linear feed will intercept some signal (although 'down 3 dB') from a circular polarized waveform, so too will a standard North American standards receiver also intercept and demodulate a half transponder format signal. The penalty, interestingly enough, in the best case is similar to the linear VS circular penalty; about 3 dB.

That means that in the absolute worst case, if you tuned in an Intelsat half transponder service signal using a **full** transponder bandwidth receiver, and a **linear** polarized feed, you would be 'giving up' (as in not making use of) about 6 dB of the available signal; 50% of

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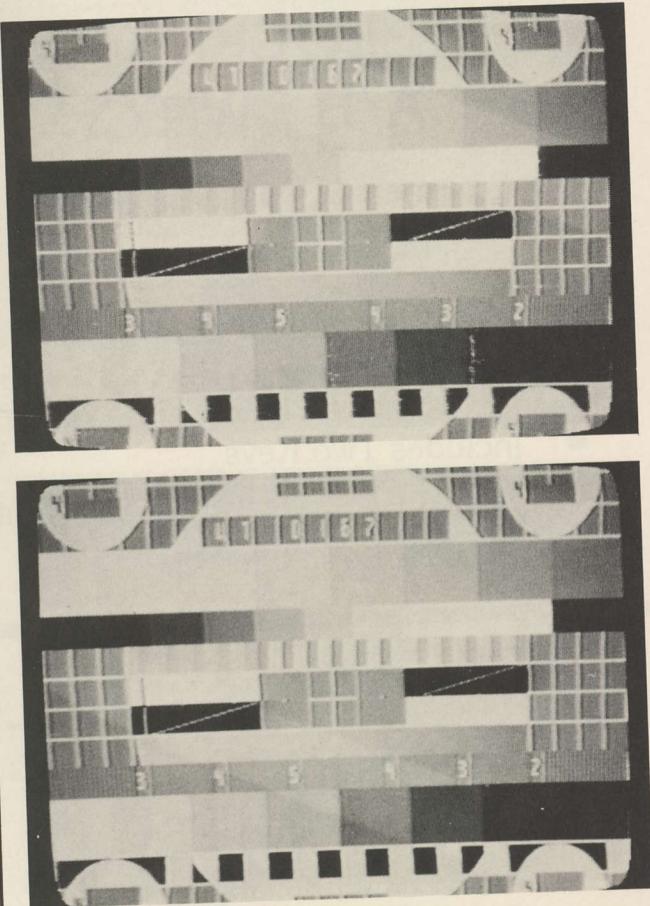


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**RUSSIA'S GHORIZONT** bird at 14 west offers around 15 hours per day of Russian, many European and Cuban-Spanish feeds with an EIRP that translates to around 31/32 dBW on (US equivalent) transponder 9, over all of Africa and South America (above the equator), Europe and into all of the Caribbean and along the eastern edge of North America. Bandwidth is wider rather than narrower (than) US services; 50 MHz. Top photo shows reception on 20 foot terminal with half transponder IF; bottom photo is of full transponder IF.

that due to the feed, and the balance due to the receiver bandwidth. To put that into perspective, if your receiver is capable of delivering threshold (no sparklies) service with an 8 dB CNR (carrier/to noise ratio), and you have just enough antenna and LNA to make the grade with a circular feed and half transponder receiver, by using a linear feed and full transponder receiver your CNR is now 2 dB. That is just about enough CNR to tell that "yes indeed, there is television there!".

In a 29 dBw footprint area, an 8 dB CNR threshold receiver, and a 100 degree LNA, you should find a nearly sparkle free picture with a good quality 12 to 13 foot dish; one that delivers an honest 41.5 to 42 dB of gain. That assumes a circular feed and a half transponder format receiver.

In the half transponder transmission format, the amount of signal lost due to trying to recover the service with a full transponder format receiver can be confused by **how** the non-video half of the transponder is put to use. For example, if the lower half (most common) of the transponder is used for video, but the upper half is not used for anything, then in effect the upper half has no signals present. Now your loss is close to the theoretical 3 dB that defines half transponder service IF bandwidth as received in a full transponder bandwidth receiver.

## The Audio Problem/Solution

When the audio is carried as a sub-carrier, recovering the audio is a relatively painless task. A receiver equipped with both 'wide' and

'narrow' audio filtering (usually on a receiver control panel switch) is recommended, however, since signals that tend to be 'close to

#### WHAT TO EXPECT IN THE EASTERN SKY

**14 WEST/G(h)orizont** Set receiver to transponder 9 (North American dial). Audio will be found at 7.5 MHz, standard sub-carrier. Programming weekdays to around 3PM eastern, then test pattern (see photos). Evening programming 6/7PM eastern, weekends, for Cuba. Signal will vary in level as bird drifts north and south of equator in an approximately 24 hour figure '8' cycle. If your look angle is above 15 degrees, this should be one of the strongest signals you will ever see, at the point when the bird crosses over the equator in figure 8 pattern. You **may** also see a far weaker signal at US dial position 6, on a beam favoring Europe.

**18.5 West/Instelsat** Set receiver in scan-tune mode as you move dish westward from G(h)orizont. Relatively low level data and SCPC carriers will pop up, usually on (US) dial position 1, 9, 15, 17 with very **strong** carriers on 5 and 7. US network video (i.e. CBS London) on 17-19 dBw Global pattern may be seen on transponder 24 if your six meter system is working very well. Other video is rare on this bird, towards the west.

**21.5 West/Intelsat/** Set receiver in scan-tune mode as you move westward from 18.5 west. Very **strong** video signals on US dial position 1, 5 (Rede Globo, Brazil), a weaker video signal on US dial position 12, and moderate level data on 14 and 18 will complete the picture. Occasional US or European video will also be seen on Global pattern on TR24. If 1 and 5 are noise free, but 12 is about 1 to 2 dB below threshold, your six-meter system is working OK. Audio will be standard sub-carrier, 5.8 MHz.

**24.5 West/Intelsat/** Set receiver into scan-tune mode as you move westward from 21.5 west. Moderate level data and SCPC will be found on TRs 1, 3, 5, 9 and 15. There may be Global pattern video, typically a European office of a US network feeding into the USA (late in afternoon) on TR24 with a standard 5.8 MHz audio sub-carrier. Other video on this bird is rare on the western antenna patterns.

**27.5 West/Intelsat/** Set receiver into scan-tune mode as you move westward from 24.5 west. If you are looking **after 5 PM eastern**, you will find very strong video on two transponders and weaker video on two more. Peru with no detectable audio will be on TR1; Colombia with no detectable audio will be on TR3. Venezuela with a powerful signal, and standard 5.8 MHz will be on TR5, and, Argentina with strong video and standard 5.8 MHz audio will be on TR24.

**34.5 West/Intelsat/** Set receiver into scan-tune mode as you head westward from 27.5 west. Moderate to weak level data and SCPC will be found on TRs 1, 5, 7, 9, 11, 13, 15 and 22 with a very **powerful** data network on TR3. Video, if found, will be on TR24 in a Global pattern and will largely be for US or European news feeds.

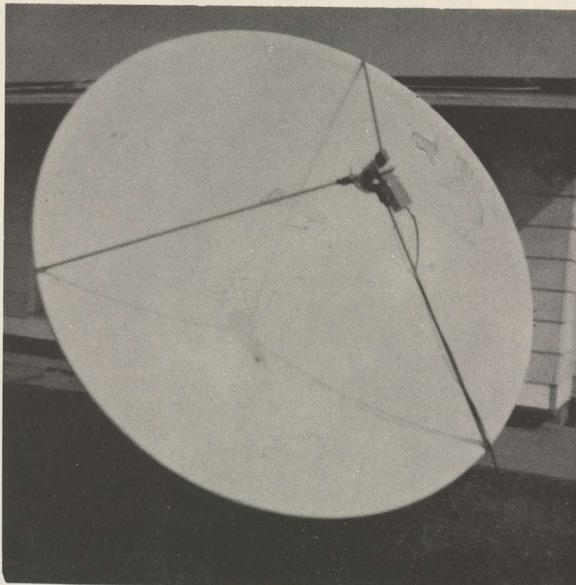
From 34.5 west to the next Intelsat, the bird leased to Mexico at 53 west, is quite a distance across the sky; the equivalent 'hole' of from Westar 4 to F2 in the domestic sky.

**53.0 West/Intelsat/** Set receiver into scan-tune mode as you come west from 34.5 or go **east from** 79 west (Westar 1/2). You will find moderate level TV signals on transponders 1, 5, 7, and 8; the closer you are to the Yucatan Peninsula of Mexico, the stronger these signals become. The lower three are from Mexico while the fourth is from San Diego (Ca) with a mixture of US network programming. Audio is standard 5.8 MHz sub-carrier. This bird is visible to most of the USA except for the far northwest, and affords an excellent opportunity to test and perfect circular polarized as well as half transponder wide video product.

'threshold,' or the noise, will by nature have noise in the audio as well as in the video. Just as the half transponder video format helps drag these weaker signals out of the noise for better **video** quality, so too

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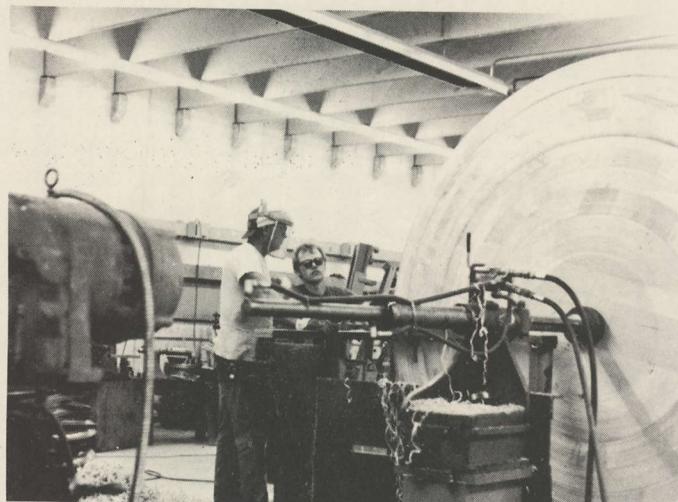
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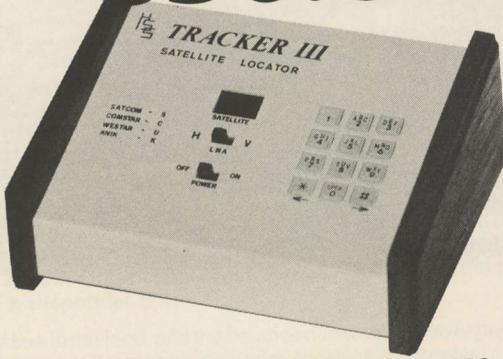
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does the 'narrow' audio position help with cleaning up the audio portion.

Peru and Colombia in South America (plus Saudi Arabia and many of the other African nations) do **not use** the standard in-transponder sub-carrier format for their audio. This subject was discussed at some length in the recent November (1982) issue of **CSD** and therefore will not be repeated here. The solution to this problem is not inexpensive; it requires a TVRO receiver interface that allows you to tune in the video in one half of the transponder, and the audio in a narrow band (SCPC) format in either the top half of the same transponder, or, on a transponder considerably removed from the video transponder. **Hero Communications** (Hialeah Fl.) has developed a special interface package for the AVCOM series receivers that allows this to be done. Those facing this problem should contact Hero Communications directly.

However, if the upper half has a number of SCPC (common) or data signals present, these non-video signals will fall inside the IF passband of the receiver, and they will be present to the receiver demodulator. They won't translate to video. They will translate to 'squiggly lines' on the screen, or worse yet perhaps, 'noise' that adds on top of the lack-of-signal noise present. The net effect is greater video signal degradation than the simple 3 dB reduction in CNR would account for.

In the worst case, if **both halves** of the transponder are in use for **video** transmission, your receiver IF is going to pass some parts of both. Your receiver demodulator may only respond properly to the one set of (half transponder) video that you have 'fine tuned' in, but the other set of video will cause streaking and noise in the picture. This is much the same effect you see when you tune in a vertical transponder on F3R but fail to have your polarization properly set to 'null' the opposite polarity. Some of the opposite polarity signal sneaks through and causes picture degradation.

A true half transponder receiver approaches the half transponder format problem by carefully processing only half of a normal 36 MHz wide transponder, at a time. This is accomplished by adjusting the IF (intermediate frequency) amplifier and filtering stages so that they are only half as wide (in bandwidth) as would normally be required. Unfortunately, a receiver equipped for only half transponder reception usually does not do a very good job for full transponder video. You may recall that if you narrow up the IF stages too far, while you **can** improve the video signal to noise ratio on a full transponder signal, you also lose some of the picture information. Video detail, or crispness suffers (see **CSD** for October 1982).

This suggests that a proper receiver, designed for **either** format, would be cabable of 'switchable' half transponder, or full transponder video. At the moment there is only one receiver supplier addressing this segment of the private or semi-commercial marketplace, and that is AVCOM of Virginia.

The first such receivers went into Africa and the Middle East where they are largely used solely in the half transponder format position. More recently, the latest version of these receivers have been also going into South America and the Caribbean where with a 'horizon to horizon' dish, the terminal user has a selection of not only the Atlantic Intelsat group of satellites but the US and Canadian domestic birds as well.

The AVCOM approach has been to provide **dual IF systems** in such receivers, with a few extra perks for non-North American signals. The COM-3R International, for example, has a pair of IF systems inside; one tuned to a nominal 28 MHz bandwidth with a second tuned to a nominal 15 MHz bandwidth. There is a switch on the receiver which selects between the wide (28) and narrow (15) MHz bandwidth IF systems. Relays inside of the receiver select **which of the two** IF systems is put into use by the external switch.

In addition to that, both the COM 3R-International (home version) and the COM 66T (commercial version) receivers have a pair of video 'peaking controls'. These controls allow the terminal operator to optimize the demodulator circuit for the particular video format in use. This is an especially useful network for those signals that are at or below threshold, since it gives the user the ability to gain the last fraction of demodulator efficiency from the system, compensating for different modulation characteristics. Low signals that tend to 'band' or 'streak' in a receiver in particular are aided by these controls; with the pair of

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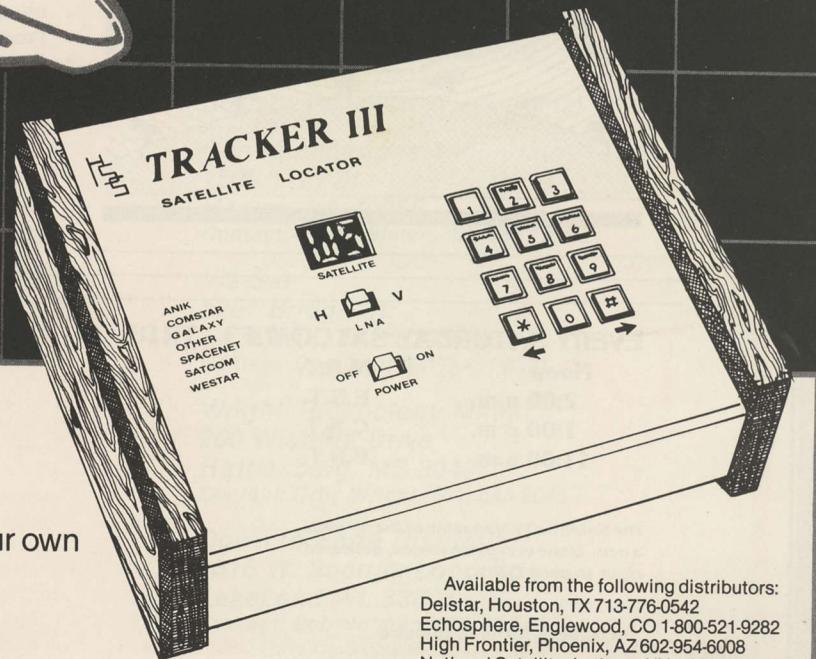
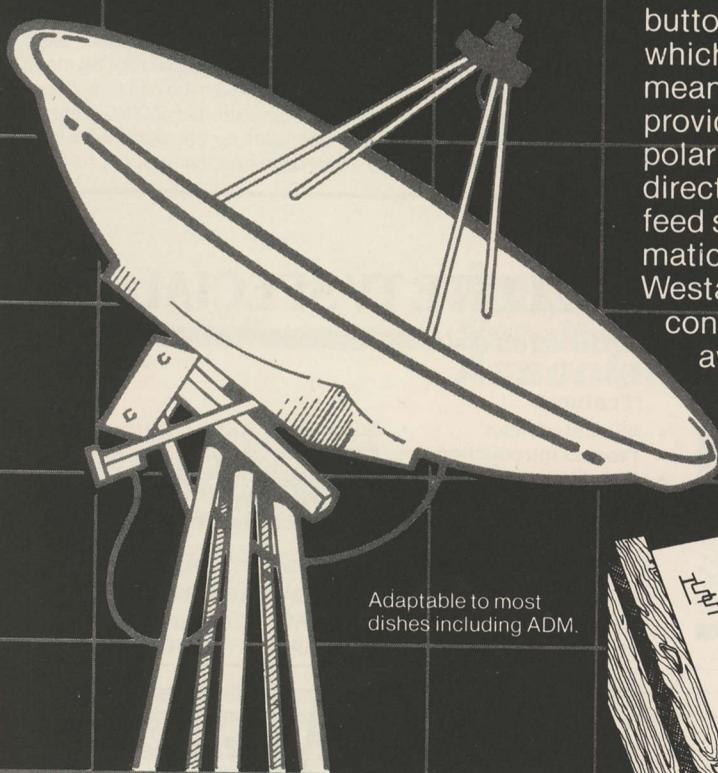
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adjustments the user can eliminate the banding even though the signal is below threshold.

The COM 66 series of receivers was designed for commercial applications. It features a block downconverter which frequency translates the 3.7 to 4.2 GHz region down into a high region of the VHF spectrum/low UHF. The rack mounting demodulator package has all of the special half/full transponder circuits inside. With the block down conversion scheme, two or more indoor mounting demodulators are fed signal from the (typically) outdoor mounting downconverter. Low cost RG-59/U or RG-6 type cable may be used for the antenna/downconverter run to the demodulators. Standard CATV/MATV type VHF-UHF signal splitters are used to divide the incoming signal voltage into the required number of 'parts' to connect to the individual demodulators.

For a semi or full commercial installation, the 24 channel tunable 66T demodulators are dedicated to a single channel each. They 'back' each other up since they can be changed at will to any of the other transponder frequencies offered. Because they can be switched between full and half transponder format IF, it is possible using one block down converter to individually receive, and demodulate, mixed half and full transponder signals from the same bird. The Intelsat IVA bird, located at 53 degrees west, for example, has four video services for internal use within Mexico. Both full and half transponder video is carried on this bird and the 66T series will handle either format with equal agility.

The same 'mixed format' problem crops up on other Intelsat birds and any receiving system that might otherwise require complex 4 GHz splitters to accommodate the individual full or half transponder formats can with the 66T package be accommodated with a single block down converter and indoor splits using the standard CATV/MATV signal splitters.

#### Using Half Transponder Domestically

Any discussion of half and full transponder reception, and the special switchable receivers which allow this to happen, would not be

complete without a look at what happens when you tune in a (US or Canadian) domestic satellite while in the **half transponder position**. In theory, by using a narrower IF bandwidth you can gain some reduction in noise on a weak signal.

We have been utilizing a switchable full/half transponder format receiver on a motor driven twenty foot antenna in the Turks and Caicos for nearly six months now. Our **initial** reaction was that while it was difficult to measure the improvement with test equipment, if you were dealing with a signal that was one or two dB below threshold (ie. into the noise), in a full transponder IF, that by switching to a half transponder IF, there was a marked improvement in the video signal to noise ratio.

Long term the results are not so positive. First of all, when you go after a 36 MHz wide signal with a 15 MHz IF, you are giving up reception for some of the video information present. That translates to a loss of picture detail or crispness. It is a moot point to debate whether more noise or less detail is a worse problem. You can't have both at the same time, in any event. An even greater problem, with a narrow or 15 MHz region bandwidth, is the long (and short) term stability of the receiver proper. When your receiver is in the 'wide' position, it can 'drift' (as in change frequency) by a few megahertz and you don't notice the drift. The signal is still moving through a 'wide opening'; represented by the wide IF. However, when the receiver is in the narrow or half transponder position, the exact center tuning becomes far more demanding and you will notice both short and long term drifting problems. This means that for a 'set and forget' installation, the improved video signal to noise (with the trade off of lower picture definition) possible with a narrow/half transponder IF may **not** be a good choice.

The other side of that coin is that because not all domestic bird signals use the same (dependably stable) modulation width, you may find that some transponders improve quite a bit with the half transponder IF while others improve not at all. As an example, WTBS can be improved by several dB while HBO degrades by the same amount.

**Recommendation?** Using a switchable half transponder format



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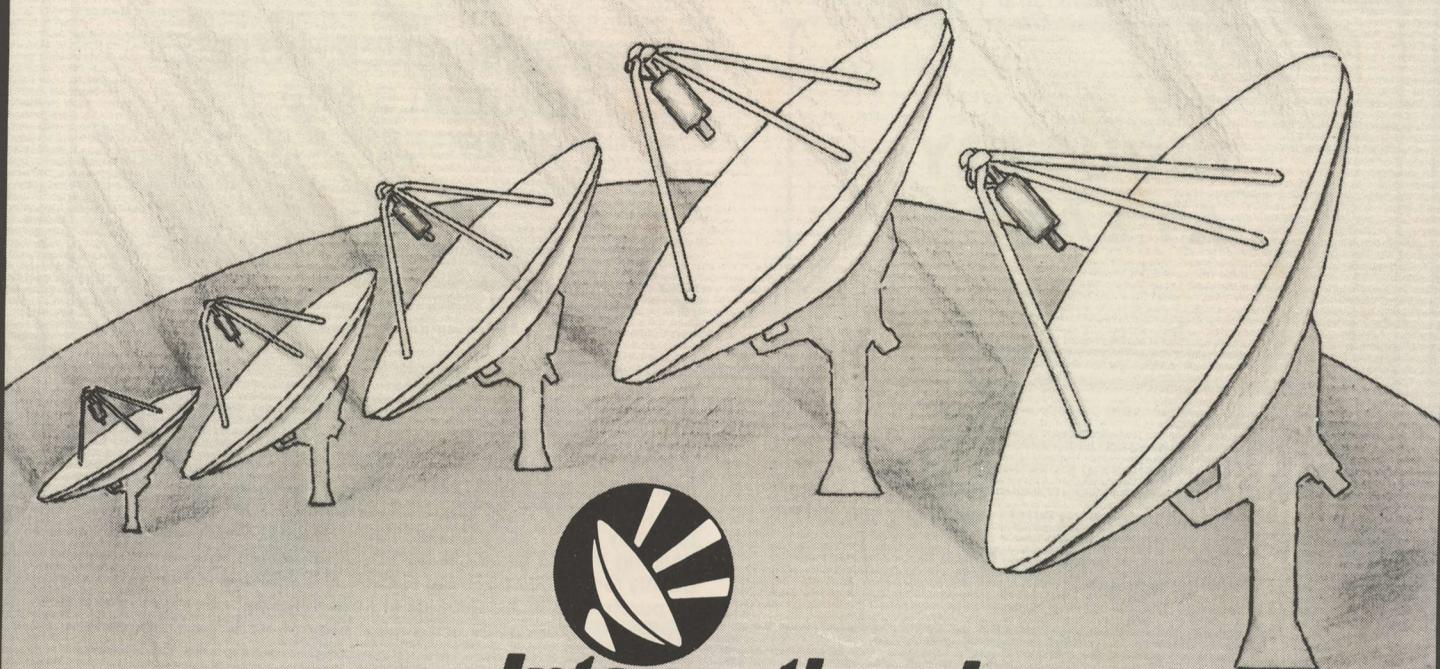
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receiver for recovering video from a full transponder domestic satellite is another weapon in the arsenal against below threshold signals, but its use must be carefully controlled on a transponder by transponder basis. Furthermore, even in the best case you will have to 'tend to the tuning' of the receiver every few hours to compensate for frequency drift. None of this would be a problem for a home viewing system which involves quite frequent changes of program sources anyhow. But for any semi or full commercial installation, the advantages would be short lived and the service calls a pain in the neck.

Private or semi commercial installations fed by Intelsat services have come quite some distance since the first tests were conducted by the industry at the Miami SPTS event held in February of 1980. There, a 13 foot and a 16 foot antenna produced viewable but hardly high quality signals from Rede Globo in Brasil in the parking lot of the Miami Bayfront Park Auditorium. Knowing how to squeeze the last fraction of a dB of CNR out of an incoming signal remains very important for Intelsat installations, but the industry is learning how it is done and we are getting better at it with every passing month.

## INDUSTRY AT LARGE

### KITS AND SCHEMATICS

I have become very interested in satellite television reception and I am trying to find information (wiring schematics, parts suppliers, etc.) so that I might try from scratch to build my own receiver. Up until now, I have not had very much luck locating what I need. Someone told me that Bob Cooper may be able to help.

William M. Green, Jr.  
P.O. Box 276  
Warrington, Pa. 18976

**Let's deal with kits first.** Ramsey Electronics (2575 Baird Rd., Penfield, NY 14526; 716/586-3950) has a kit of the popular R2B receiver. A series of articles describing that receiver kit appeared in Radio Electronics magazine last spring. Their R2B kit is \$395, but does not include a modulator. Electronic Rainbow, Inc. (6254 LaPas Trail, Indianapolis, In. 46268; 317/291-7262) offers a kitted receiver for \$395. Their receiver also has a modulator included. From absolute scratch, STTI (P.O. Box G, Arcadia, Ok. 73007) has the Taylor Howard receiver manual (\$30) which describes the now famous receiver system first developed by Tay Howard. A circuit board source is given in the manual.

### KEEP OUT THE PUBLIC

I attended the Atlanta SIBOC in Atlanta. Why in the world do the show operators allow the general public to attend? I am a dealer in the Atlanta area. KELGO allowed me into their booth as a retail dealer on Sunday. A retail customer came by our booth and took a retail catalog. Ten minutes later when I went on a break the retail customer was sitting at the National Microtech booth being sold a system for \$1495. Just as though he was a dealer! I saw the numbers on a sheet of paper so I know this to be a fact. This is certainly no way to help us as dealers!

Mick Moon  
Sharpsburg, Ga. 30277

This has been a problem since the very first industry trade show. Several solutions have been proposed. One suggestion would have all pricing sheets and all show signs prepared in retail pricing. Then real world dealers would have to meet 'privately' with the booth personnel to get their applicable dealer price. That is probably unworkable. Another solution is for anyone attending to present at least a business card which clearly shows they are a dealer, before they get in with a dealer badge. Retail customers would have different color badges and those badges would signal anyone talking with them to keep pricing on a retail level. That is probably another unworkable concept. A man who says

## CORRESPONDENCE, NOTES, REBUTTALS AND CHARGES . . .

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He is a dealer (it is an easy thing to say) or who says "I want to be a dealer" can get by any reasonable kind of entry point inquisition system. If you were faced with a \$3,000 retail price tag for a system for your home, and you knew that just the other side of the door there were identical systems for \$1500, you would probably say "I am a dealer" too. The best and most effective policing should be at the booths themselves. For someone to qualify for a \$1500 price tag system, they should at the very least be purchasing in a dealer lot of three terminals or more. Selling one terminal for dealer price just because someone mouths the words "I am a dealer" is foolishness. Unless the dealers are properly supported by the distributors and manufacturers, pretty soon there will be no dealers left. Holding up dealer pricing for bona fide dealers, who qualify themselves as dealers because they purchase some minimum (such as three) number of packages is the least that the distributors and direct selling OEM's can do for the dealers.

### PRINT DESCRAMBLER CIRCUITS

I read with interest your statement in the November '82 issue of CSD concerning whether or not CSD should run de-scrambler advertisements. As a subscriber for over two years, I am very interested in seeing descrambler circuits with detailed information as to 'how it works.' In previous issues you made a commitment to readers to publish such circuits. Now that ANIK D is encrypting, there is no longer any reason to hold back. I hope to see some technical articles on this subject soon.

Mark Firnoff  
Illinois

ANIK D uses the Oak Orion system. And they are having massive problems with the system. Oak first delivered the system when the CANCOM Vancouver/Edmonton/Ontario service signals were still over on ANIK A2/3. They found out that the version of the scramblers they were delivering were experiencing a very high failure rate. As one Canadian put it so succinctly, "Oak is not having any problems with their scrambling; it is the descrambling that is giving them fits." Between the early A2/A3 trials and the switch over to ANIK D, Oak went back to the drawing boards and started over. When ANIK D first came on the air, they ran a few weeks without encryption. That allowed all of the A2/A3 CANCOM terminals to get their antennas swung over into position. Then OAK distributed, via CANCOM, a new version of the decoders. We have numerous reports from Canada advising us that between 25% and 50% of the units shipped failed to

work. First Oak tried to blame the receive terminals but when a man has four CANCOM signals coming off his dish, and he finds that out of four descramblers he was provided only one or two will work, and swapping them from service to service makes no difference (they either work or don't work), he knows it is not his installation. That led CANCOM to turn off the scrambling in late October for a couple of weeks while they tried to get working descramblers into the field. Then when they came back on, somebody really screwed up and the CANCOM scrambling from Oak somehow got into the satellite delivered telephone circuits that feed the Eskimo and Indian terminals in the far north of Canada. That knocked out telephone service and vital health communications, and this caused them to shut down the scrambling once again. Since that time, they have been running one or a couple of channels encrypted on some days, none on others.

The problems they are having are two fold. The Canadian football league and other program rights owners are all over CANCOM to scramble, or, stop using events which CANCOM is licensed to carry. When CANCOM turns off the scrambling (for whatever reason, including allowing the Eskimos to call out for medical help!), the football and hockey and so on goes all over North America. CANCOM is paying the program rights owners for a specific number of controlled (via scrambling) receive locations. **Unscrambled**, the 'potential number' of receiver locations numbers over 100,000; far more than CANCOM is paying for. The CFL et al want to either be paid for all of the terminals that might be using those events, or, for CANCOM to control who gets it. CANCOM is caught between a rock and a hard place.

Another big problem they have had is the computer addressability of the system. A master computer creates an address which is supposed to tell each authorized terminal to 'turn on' several times per hour. If the terminal is already 'on,' the signal simply re-enforces that instruction. If the terminal is off for any reason (such as a local power failure that occurs between computer addressing cycles), the address turns the terminal back on. In the Canadian north, power failures are common and terminals do

turn off now and again; and, lose their 'addressing instructions' quite often. That all sounds dandy. Unfortunately, CANCOM has had big problems with the computer they are using and our sources inside Canada tell us that the computer is 'down' as much as 50% of the time. This means that if a terminal loses power or somehow gets turned off and then back on, it could be days (or longer!) before the computer is back operating and can tell it to 'turn back on.' The net effect is that CANCOM is facing a real world revolt; cable systems and others who have signed up for the CANCOM service are withholding payment, and telling CANCOM what they can do with their Oak Orion descramblers. The public is suffering of course because they are paying for service which they are not getting.

#### JAPAN/FAR EAST # One

I want to submit an opposing view to the consistently heard theme that (1) offshore companies will eventually take over the (home) TVRO satellite market, and, (2) the market for earth stations is highly elastic to price.

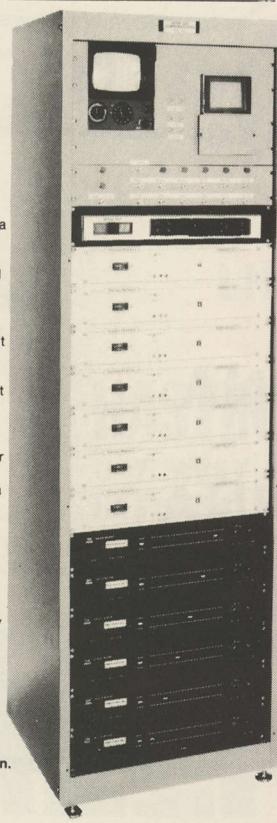
First of all, the Far East can be beaten. **Lowrance Electronics** is the leader in another consumer electronics market, sport fishing sonar. We currently enjoy about 42% of the total market despite the fact that of roughly 45 total competitive brands, 43 are made overseas. Now, let me say up front that despite the fact that the sonar market is presently larger than the satellite receiver market in dollar volume, the sonar market is 'mature' while the satellite market has unbelievable growth potential. Thus we will probably be competing with much more talented overseas firms that we have ever dealt against previously. Having said that, let us look at the elements of the 'battle.'

We can conceivably win in engineering, we can conceivably win in marketing, we can conceivably win in reliability; we will most assuredly win in service and customer relations. **We will probably lose in pricing.**

I submit that price is the **least important** of the elements. As an example, one type of sport fishing sonar, the graph recorder, is generally sold by brands made overseas for \$300 to \$350. Our (Lowr-

- B&W TV Monitor
- Security TV Camera
- Test Points for Satellite Receivers
- Additional Channel Modulator
- Satellite Receiver
- Color TV Monitor
- Test Points for Input
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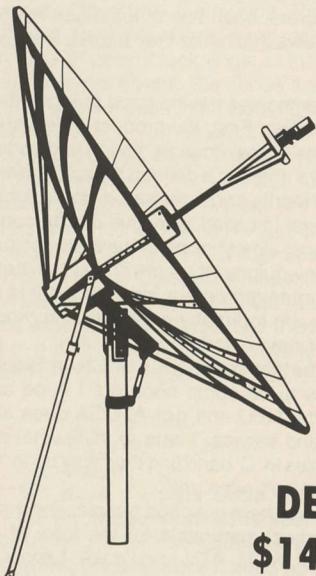
1-800-228-4007



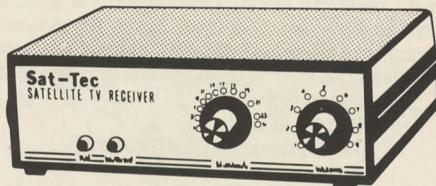
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**SYSTEM 100 A**



**DEALER  
\$1475.00**



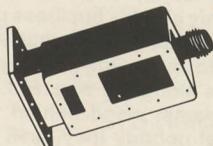
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ance) graph recorder sells for approximately \$750, yet we have a 60% share of that market. **How?** Number one, engineering. We consistently lead the field. This year's model is the first microprocessor based recorder, and that gives an almost infinite range selection, printing its own lines and depth ranges on a paper display. Number two, marketing. We lead the field in advertising, promotion and direct selling. Number three, reliability. We are perhaps the world's only consumer electronics company to use military quality control standards. Despite a product environment of pounding waves, direct sun, temperature extremes and salt or fresh water spray, we have an overall failure rate of less than 8%. Number four, service. We have over 100 service centers throughout the country and our parts supply and our engineering staff is conveniently located on the 'same continent' as the product is being sold.

**Next** I would like to take issue with those who feel the market is highly elastic to price. Whether a total TVRO system sells for \$4,000 or \$3,000 or \$2,000 does not make enough difference in volume to justify cutting the quality. Cheap boats and cheap cars are not what we see selling today. The average man may now buy a **smaller** boat or car, but he wants quality and he will fill it with plenty of extras. Boats can be purchased for less than \$3,000; but, the average into the water price is over \$10,000!

I say all of this for two reasons. One, manufacturers, distributors and dealers should not neglect quality or reasonable margins to cut prices. Two, American manufacturers must realistically assess their own competition, and overseas competition is certainly formidable. But it is very premature for Lowrance or any other solid American competitor to believe that an American company, or American companies as a whole cannot dominate this industry.

Michael Render  
Product Manager/Satellite Communications  
Lowrance Electronics, Inc.  
12000 East Skelly Drive  
Tulsa, Ok. 74128

**Those who feel American industry is doomed in the home TVRO field neglect to consider why the Far East does dominate so many of the electronic fields. The original VCR was an American development. But before it got very far along, it went to the Far East where it was refined into a consumer product. There never was a home VCR manufacturing industry in the United States. The Japanese dominate home television and sound equipment fields for a different reason; they came in late and started off with automated production facilities which drastically cut their cost of production. The American firms went out of business, or overseas, because they were not smart enough, or financially able, to drop their 1950 assembly techniques in favor of 1970'ish automation techniques. We didn't have to lose that industry to Japan; we did so because we failed to adopt modern production practices. In non electronic fields, the same thing has happened or is happening in automobile production. The Japanese no longer have truly low (by world standards) labor rates; what they do have is magnificent approaches to efficient automation of every step of assembly. We can learn from them; there is another thought on this subject this month also.**

#### UP TO HERE/JAPAN # TWO

I have had it up to here with equipment manufacturers, and, distributors. Intelligent people ask how the Japanese can come in and take over so many different US industries. Well, if the people in our business would stop and analyze it, they would either put up or shut up.

When a Japanese firm advertises a product for sale, that is exactly what they are doing; **advertising that the product IS for sale(!).** They are not taking orders, still working on product development, or as in some cases, **taking deposits** and then going back to develop a product around the money they have taken in.

We have enough problems with the pure junk that is hyped as 'professional' quality, but to also see people taking orders and deposits before they have even fully developed their 'junk' is absolutely the end. All of this then leads to the inevitable back orders due to such great demand.

I have been working in broadcast television for fifteen years,

having worked at various times with ABC, NBC, CBS, PBS, CBC, HSN, Wold, RKO, Westinghouse, Storer, BBC and NHK. During this period of time I have performed maintenance and operation on equipment manufactured by companies such as Ampex, RCA, GE, Microwave Associates, Scientific Atlanta, Tektronix, Grass Valley, Conrac, Sony, Hitachi, NEC, Ikegami, Panasonic and JVC. Of these companies, only seven live up to the standards that should be expected of a good OEM. And, you can probably guess which six make up the majority of the seven companies I would rate as 'Good.' Of the American manufacturers, each has at least one major flaw and in a couple it is several flaws that make their futures look to be on the fatal side.

The Japanese companies have a good grasp of the process from manufacturing to retailing. First, the product is delivered when promised. Second, all of the proper documentation and pertinent accessories are included. Third, there is a defined repair or parts procedure if a problem arises. And fourth, and foremost, it works right out of the box! (And that, dear hearts, is called 'effective quality control.)'

Of those four steps, almost **none** of the manufacturers or distributors of home satellite equipment meets one of the steps, let alone all four. It is a sad commentary on our industry but it is something that must be said. There are too many people selling products that don't work, won't work, or never worked.

Reading of the further adventures of Steve Birkill with ALCOA/NEC, there appears to be some hope but I hope out of the NEC/ALCOA marriage that NEC and **not** ALCOA does all of the quality control, marketing and service. I hate to think what might happen if some of the bad apples in 'C' band find their way up to 'Ku' band; stand by for trouble we haven't seen yet!

Just to let you know there are good people, and that it can be done right, I have the highest admiration for the folks at AVCOM, Earth Terminals, Chaparral, ADM, ATV and Drake. I know there are more like them out there; unfortunately, I have simply not found them in the jungle yet. When I talk with people like Clyde Washburn, Andy Hatfield or Jamie Gowen, I think back to a chap named Art Collins of Collins Radio. When Ku band (12 GHz) comes down the pike, these Art Collins types will be there and, hopefully, most of the rest will be back selling refrigerators to Eskimos. I just pray that there is no wind where the Eskimos are, because like most of our home terminal antennas the refrigerator is just going to blow over!

Ralph McClintock  
TR Communications Systems  
Box 398  
Dover, Ma. 02030

**There is, we agree, a great deal of product junk out there. And more is introduced every month. On the other hand, it has been the small guy that started off on a shoe string that has made it possible for this industry to develop so rapidly. There is, certainly, shoddy equipment, there are certainly shoddy business practices. That's the negative side. The positive side is that Andy Hatfield started in his 'garage' and so did Jamie Gowen. They had their own share of imperfect products along the way. But they had the honesty to admit their problems, stand behind their products, and the integrity to see that nobody they dealt with ended up in a losing position because of something either Andy or Jamie did or did not do. It appears to us the one key element of your four points which is so dramatically separating the successful firms from the losers, in this stage of our industry, is 'service' or 'customer backup.' If a manufacturer really wanted to take the lead, he would plan his major marketing emphasis on his ability to deal directly, quickly, and honestly with customers on the phone or in person when they do experience problems. When you bring a new person into this reasonably technical industry and turn him loose with a relatively complex electronic communications system, there are going to be mistakes; even if the equipment is operating perfectly. Now add to that mix equipment which requires some hand tweeking or special care, and you have a disaster waiting to happen. Complete dealer education, backed up by a direct telephone line to a dealer service specialist would alleviate many of the problems we have in the field. Unfortunately, too few of the suppliers recognize that hiring a man to do nothing but provide dealer backup is perhaps the best selling**

tool they have. A guy that gets into trouble with an antenna or receiver, and who gets the run around trying to get some help, is not apt to come back to that supplier for more antennas or receivers. Just helping someone out, over the telephone, can spell the difference between keeping and losing a customer.

#### STICK IT UP!

I thought you might be interested in how we resolved a difficult installation problem for an executive of ABC Sports who lives just outside of New York City on the Jersey side. The locale is blessed, or cursed (your point of view) with tall trees and rolling hills. There was no way to get any type of decent look angle at the lower satellites from anyplace in the customer's yard. We chose the Harris 10 foot Delta Gain antenna because we believed it would give good performance; the problem being how do you mount it? We went to South River Mounts and discussed our problem. They came up with the mounting arrangement you see in these photos. This 21 foot 'mast' is fabricated from an exceedingly heavy thick wall pipe. We start off with a 6 inch OD section that is down in the ground six feet, and eventually end up with a 4 inch diameter piece at the very top. South River adapted the mounting point for the Harris to a special motor drive arrangement that gives the viewer the same access to all of the satellites which a normal ground mounted antenna would have. Our thanks to South River for helping us out of a difficult spot, and now we know how to handle a common problem in the northeast; getting up and over buildings and trees!

John Zelenka  
Star Video Systems  
Queens, N.Y.

Very nifty. We have a Harris Delta Gain ten footer in the islands now and for those who remember my tirade against Harris for announcing their new antenna with a promise that I would eat something unpleasant if it lived up to their early-hyped 4.5 meter performance claims, rest easy. I won't need any Bromo Seltzer. The antenna works exceedingly well for a 10 footer and (the mount aside) was a joy to put together. But it is not the equal



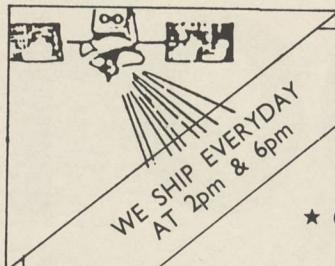
of a 15 footer as we shall investigate in some detail in an early issue.

#### COOP ON THE AIR?

I am an individual TVRO operator and I am also active on fast scan TV on amateur radio. If your schedule will permit, I would like to correspond with Coop and hold a ham radio schedule with him on the air.

Ken Blaton (W5CBT)  
4700 Matador  
Amarillo, Tx. 79109

Coop has been a licensed ham for over 25 years (my how time flies when you are having fun!) and owes his interest in satellites to his early days of getting hooked on electronics from amateur radio. A very nice, and educational hobby for those who are looking for something to get their kids out of the video game



### SATELLITE RECEPTION SYSTEMS, INC.

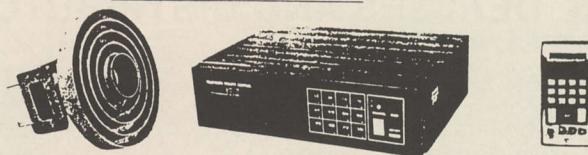
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parlors and off the streets. Presently, he has a US 'call' (K6EDX) and a Turks and Caicos call (VP5D). Wife Susan has both a stateside and Provo call (VP5DYL) while son Kevin is licensed as VP5KC. Unfortunately, the ham radio gear (which is housed in a special 'radio control room' at the WIV annex) largely is dis-used. During the recent Satellite Retreat attendee Tom Harrington fired up the station as VP5DX and in minutes found himself engaged in conversation with a fellow located in Tunis in North Africa. Whenever we 'missed' Harrington during the Retreat, we knew we could find him buried behind the Cooper ham station equipment racks.



**OPERATOR HARRINGTON** engaged in a ham radio contact with some far away place.

**COULDN'T MAKE THE RETREAT**

I am terribly sorry that I will not be able to visit your anten-na-infested island on my trip to the states in November, but as the

enclosed schedule shows it is utterly impossible! Maybe next time.

Arthur C. Clarke  
Colombo 7  
Sri Lanka

When we noticed that Arthur C. was scheduled to be in New York City on November 15th to appear on the TODAY Show (you DID catch him, right?) and that his schedule then called for him to be in Los Angeles on November 17th (he was to visit the California Jet Propulsion Lab on the 18th and 19th, returning home to Sri Lanka on the 24th) we urged him to join us on Provo for our Satellite Retreat. We had not reckoned with the hectic schedule his US publisher had arranged for him (November 16th, reception at Sri Lanka Embassy in DC; etc.) in advance. After everyone watched him on satellite, on the TODAY Show on the 15th, many of the Retreat group took the balance of the day to qualify for something called a 'Resort Course' Scuba Dive permit. Others in the Retreat group already were certified for SCUBA diving. That Monday afternoon around 9 or so, accompanied by Kevin Cooper, a diving instructor and a boat operator took off in a dive boat to head off three miles or so just outside the Provo north shore reef where they dived 'the wall'; a spectacular underwater cliff that drops off several hundred feet very quickly, and where undersea life abounds. Unfortunately, after the dive, they could not get the brand new (ten hours of use) boat motor started. Dusk was falling and they were anchored some three miles from shore in six foot swells. The dive instructor and Utah's David Lyman dropped over the side of the boat and started the long 3 mile swim (through the six foot swells, across the treacherous reef, and across two miles of relatively calm surf) to shore. The rest stayed behind and Rich Potts of St. Louis kept sending out 'signals' with his underwater camera strobe light hoping to attract attention. After a three hour swim (!) the instructor and Lyman washed ashore directly in front of the WIV Grace Bay facility. By this time a search boat had been dispatched to look for the missing divers and boat. In addition to motor (starter) failure the boat had a battery problem and they had no way to signal their location. It was pitch black (no moon) and

# 1ST 2001

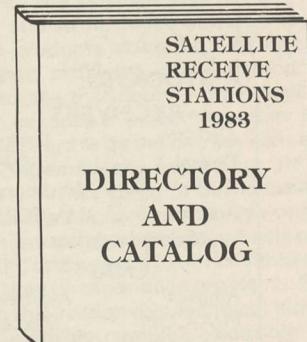
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there they were going up and down and up and down and up and down (it gives you an upset stomach just to read that . . . right!) in the big, and building swells. With the two long distance swimmers ashore, and their knowledge of where the boat was supposed to be anchored, Coop directed the rescue boat on VHF radio into the area. Potts had the smarts to have some of those small, green-glowing light tubes in his emergency kit and two of those waving about in his hands were spotted by Coop from the balcony of the WIV studio. With the swells taking the boat up and down, just the tip of the swells allowed the small green pin pricks of light to be seen, and then just for a fraction of a second. Tom Humphries was aboard the rescue boat and with his handheld VHF and Coop siting the intermittent green pricks of light, they finally got to the boat. Inside, two of the women were extremely sea sick and the rest were at best 'nervous' about their predicament. It took the rescue boat over an hour to transfer the divers back onto the rescue boat, get a line on the stalled craft and then maneuver in the dark through the dangerous reefs so they were back 'inside' and in relatively calm water.

Meanwhile back at the host hotel, Dave McClaskey was directing the troops. He had taken command of Kevin Cooper's three wheeler beach machine and climbing to the top of a sand dune he was using the headlight on the three wheeler to signal the boat that somebody knew they were out there (and help was on the way). If you can picture McClaskey draped over the front of the three wheeler, motor running, one foot locking the brakes so the machine would not roll out of control down into the ocean, and his two hands busy draping his T shirt over the front of, and then out of the way of, the headlight . . . creating his own personal version of 'Morse' (or McClaskey) Code to effectuate a signal, you

have a good grasp of the situation.

It was only funny after everyone was safely ashore. Some irony. The day prior, Kevin Cooper had rescued the 'rescue boat' from a reef just seconds before the heavy surf would have demolished the boat. Kevin was passing by when he spotted them in distress, and he took his own 15 footer along side, threw them a line, and dragged them away from the reef. Twenty four hours later that same boat, and it turned out the only boat that was available when needed to rescue the divers, came to Kevin's rescue and the rescue of the rest of the group.

Oh yes, what does this have to do with Arthur C. Clarke? Mr. Clarke is one of the world's most well known and respected underwater (marine) biologists. NOW you know why in SPACE ODYSSEY TWO: 2010 there are paragraphs relating travel in space to travel under the sea!

#### Nice People

I would like to tell CSD readers that it is nice to have people in this field who are willing to help people who get into a jam. We had a problem with a TVRO system and it was driving us nuts! But thanks, and we do mean thanks, to Earth Terminals and Chaparral, plus Taylor Howard and Clyde Washburn individually, we got it fixed and operating. All I can say is that when you go to the best in the field, you will get your problems fixed!

Ray Willhoite  
Antennas Unlimited  
Lexington, Ky 40505

Few of us realize how many times a day the telephone rings for Clyde Washburn, or Tay Howard and others who have labored long and hard to build a worthwhile industry here.



IN SRI LANKA/ Clarke and his 'family' and some of their Underwater Safaris (Ltd.) equipment. We suspect that if you dive with Arthur C., you never get stuck on the wrong side of the reef at dusk without adequate survival gear!

## TRANSPONDER WATCH

### RECENT REPORTS OF ACTIVITY ON DOMESTIC / INTERNATIONAL SATELLITES

Send your reports to CSD Transponder Watch, P.O. Box 100858, Ft. Lauderdale, FL 33310. For late news, call (305) 771-0505.

**Dave Fedric and Horton Townes**, recently of National Microtech, have established a new distributor firm known as **Amsat**. Their goal is to offer a complete package for home TVRO installations in the under \$1,000 region.

Southern Satellite Systems (SSS) has moved the SPN feed from Westar IV, transponder 22, to Satcom IV, transponder 3. SSS is the common carrier for WTBS, does plenty of business with RCA on a regular basis. Move is seen as shot in the arm for long term viability of F4 and SSS has hundreds of dishes it supplied to cable affiliates now re-directed to F4.

**NORTHSTAR** Communications is the latest 'DBS-like' firm to announce. They will use the recently launched-by-shuttle ANIK C bird to deliver multiple channels of television to 1.8 meter diameter dishes, in a scrambled (12 GHz) format. Northstar plans to provide programming primarily Canadian in content, and use equipment produced in Canada. Northstar had previously attempted to get Canadian government approval to provide the present ANIK-D scrambled service (operated by CANCOM). No program 'launch' date has been announced, but **very** late 1983 seems likely.

**LOOK** for a second channel of Intelsat delivered US programming heading for Australia across the Pacific at an early date. Agencies involved have made application for permission to transmit service from western USA to Pacific Intelsat, and then down in Australia. Request is for 24 hour per day feed.

**RCA**, unsure how to use their own planned 12 GHz bird(s), is researching the potential size of the (S)MATV marketplace. They are considering a dual-purpose use; feeding MATV systems with part of a bird, individual home antennas with the balance.

**AUSTRALIA**, apparently impressed by the successful deployment of both ANIK and SBS birds by inaugural Space Shuttle during November, has elected to use the Shuttle for launch of domestic 12 GHz birds (see **CSD** for December 1982).

**FRANCE** will have to get along until 1984 with old and ailing pair of Symphonie birds, according to reports from France. The supplier of the new twin satellite system, to provide both domestic service to France and overseas services to French colonial areas from the present 11 degree west nominal location, **denies** that late delivery of the twin birds is the cause of the delayed lift off.

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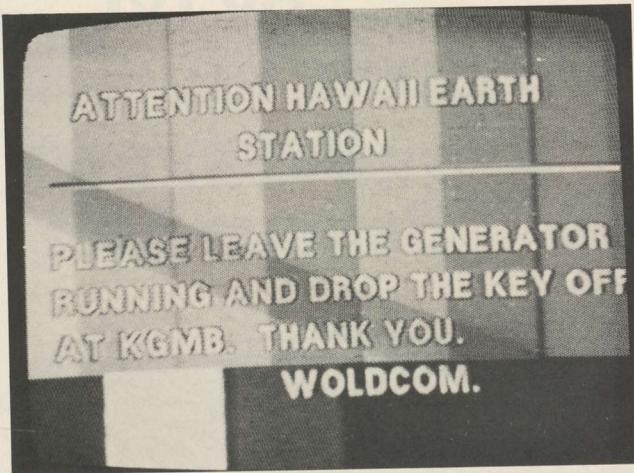
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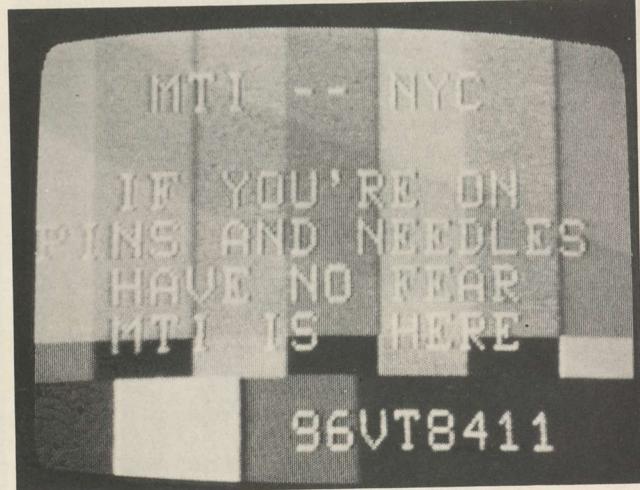
Sustaining Member Of SPACE.



**FINAL FCC** approval for additional 12 GHz DBS applicants has come down. Commission earlier approved Comsat's STC operation (see **CSD**, October 1982). Additional approvals went to **CBS** (single satellite to experiment with high definition TV, to eastern time zone); **Direct Broadcast Satellite Corporation** (a pair of channels with nationwide coverage); **Graphic Scanning Corporation** (initially two channels to western portion of US); **RCA Americom** (six channels initially, to eastern time zone); **United States Satellite Broadcasting Corporation** (3 channels over full nation, with a pair of satellites); **Video Satellite Systems** (1 channel, nationwide, requiring two satellites); **Western Union Telegraph Company** (1 channel, full national coverage, requiring two satellites). Most of the applicants are restricted to a small number of channels (in some instances one channel) per satellite by their decision to use all of the available power for one or a handful of transponders, rather than spreading the power out among a number of lower power channels. The day of 24 or more channels, all operating with high power, from a single bird, is more than a decade away.

**FORGET** about Colombia having its own domestic satellite system, soon. The study group working on the project saw the budget estimate move from \$120M to an estimated \$300M plus in just over a year of negotiations. Colombia continues to use transponder on Intelsat for domestic television and some offshore domestic telephone. Odds are the use of Intelsat may grow markedly as an interim measure now that the domestic bird is temporarily dead.

**A KANSAS** motel is being sued by a local cable system because the motel is carrying satellite delivered HBO service to customers. The motel asked for but was refused service by the cable company because the motel was beyond the region where cable service was available. The cable firm claims it has the exclusive right to provide



HBO service in the region, that its cable lines do not reach the motel in question notwithstanding. HBO has not joined the suit at this point.

**SPACE** transponder battles are ahead for Europe as the first available EUTELSAT bird, ECS-1, is scheduled for Ariane launch in April. Only nine transponders are available for lease, but nearly 30 firms or national entities have expressed an interest in using a transponder fulltime.

Some of the old, original and familiar faces at National Microtech are no longer going to appear in the 'family portrait.' Effective with mid-November, there is a new President, a new Chief Executive Officer and a new Secretary-Treasurer.



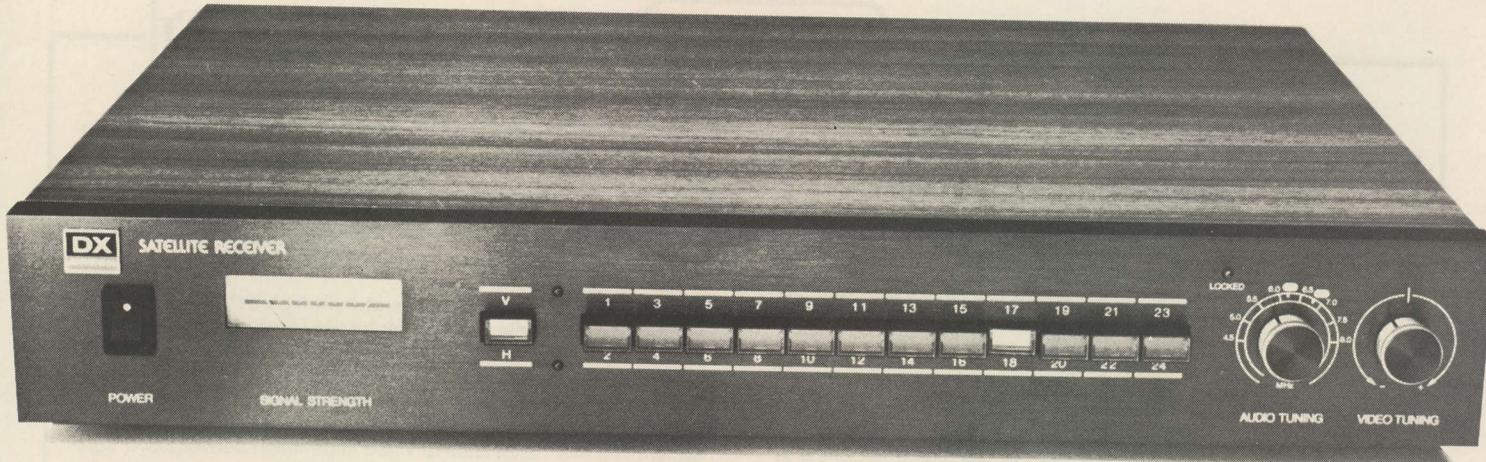
**Larry W. Ward**, a marketing pro who comes to National Microtech from M/A COM (left) is the new firm President; **John L. Grantham**, one of the trio that founded the company (middle) is the new Chief Executive Officer (CEO) while Brenda Gerard is the new Secretary-Treasurer.

Horton Townes and Dave Fedric are no longer associated with the firm.

**GENERAL** attitude of those attending and staging recent Scientific Atlanta Satellite Symposium was far from upbeat. S-A has taken licking recently in marketplace with poorly operating cable products in home terminal area, and S-A financial picture is down substantially from former years. Approximately 500 attended, according to S-A, or one fourth number who attended STTI's Atlanta show just weekend prior.

**AMERICAN** Hospital Network, long scheduled to bring up approximately 6 hours per day of high level medical training for hospital personnel and doctors, is re-targeting start-up for the middle of this year. AHN has had a variety of problems, including a lack of satellite-experienced leadership.

**FCC** has once again conducted a 'quickie tour' of the US domestic satellites surveying the number of transponders in use at the time of survey. Commission found 101, or about 40%, of transponders on



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DX also provides line amplifiers, power dividers and other accessories compatible with the DSA 642 to complete the

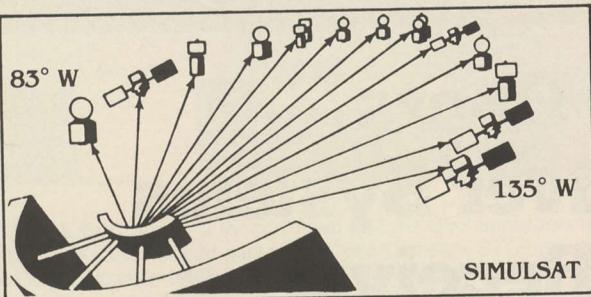
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active birds were **not in use** at time of survey. Commission is continuing to monitor transponder use to help them get a handle on how much additional room may be needed in sky for new C band satellites in decades ahead. Commission has proposed reducing satellite to satellite spacing of 2 degrees, from present four degrees. Signs point to an interim 3 degree spacing, that would probably hold well into middle of 1990 decade.

**ADDITIONAL** demonstrations of both high definition television, and sharing of a single transponder for two (or more) unrelated video program channels has added fuel to fires concerning both HDTV and scrambling. NEC recently demonstrated system that 'compresses' two video signals into a single transponder. System sets two pictures side by side, or 'horizontal stacking' rather than six year old RCA system that alternated lines of video information between two unrelated video signals. Digital Video Systems has demonstrated all digital video and audio system designed for ultimate use as high definition video system. Both systems remain extremely expensive to implement, however, and in a 'laboratory curiosity' stage of development at the present time.

**LIVE** satellite service for American service personnel in Indian Ocean, and elsewhere on European continent may be coming step closer. RCA has filed formal application with FCC to link from various US points directly to Andover, Maine via a SATCOM bird; then directly into Intelsat system over Atlantic. RCA has contract to develop and provide 24 hour US service to **overseas** bases.

**REGIONAL** Texas State Radio Network has ordered more than 100 of the Harris 3 meter Delta Gain antennas to link all affiliated radio stations via WESTAR 3 audio feed. Operation of network, replacing terrestrial telco interconnection, will begin this April.

**TRANSPONDER** configurations for RCA, as distributed within RCA operations, are currently as follows:

**SATCOM F1 / 135 west** (changes relating to Alaska expected shortly here)

- TR1 / Alaskan State TV III
- TR2 / Not assigned
- TR3 / NBC occasional
- TR4 / broken
- TR5 / data
- TR6 / NBC occasional
- TR7 / data
- TR8 / AFRTS
- TR9 / leased to government
- TR10/ data, SCPC
- TR11/ data
- TR12/ Not assigned
- TR13/ broken
- TR14/ leased to government
- TR15/ data
- TR16/ leased to government
- TR17/ Shuttle (Cape-Houston)
- TR18/ leased to government
- TR19/ data
- TR20/ not assigned
- TR21/ data
- TR22/ leased to government
- TR23/ data
- TR24/ leased to government

**SATCOM F2 / 119 west** (changes relating to Alaska expected shortly here)

- TR1 / SCPC
- TR2 / in reserve
- TR3** / Alaskan Bush SCPC
- TR4 / data, SCPC
- TR5 / data
- TR6 / data, SCPC
- TR7** / Alaskan SCPC, data
- TR8 / occasional video
- TR9 / occasional video
- TR10/ data, SCPC
- TR11** / Alaskan State TV II
- TR12/ broken
- TR13/ occasional video
- TR14/ occasional video

**TR15/** Alaskan SCPC, data  
 TR16/ data  
 TR17/ broken  
 TR18/ in reserve  
**TR19/** Alaskan SCPC, data  
 TR20/ in reserve  
 TR21/ SCPC  
 TR22/ in reserve  
**TR23/** Alaskan State TV I  
 TR24/ occasional video  
**SATCOM F4 / 83 west**  
 TR1 / HBO (reserved, GalaVision sub-leasing)  
 TR2 / CBS (reserved, not in use)  
**TR3 /** SPN  
 TR4 / Warner Amex (reserved, not in use)  
 TR5 / ABC (reserved, not in use)  
 TR6 / ESPN (used by Rainbow and Bravo)  
**TR7 /** NCN, Playboy - Escapade  
 TR8 / The Entertainment Channel (RCA)  
 TR9 / not taken  
 TR10/ reserved for Thule  
**TR11/** Warner Amex (reserved, not in use)  
 TR12/ CBS (reserved, not in use)  
 TR13/ not taken  
 TR14/ not taken  
**TR15/** Viacom/Westinghouse (in use by BizNet)  
 TR16/ not taken  
 TR17/ Trinity Broadcasting (KTBN)  
 TR18/ HBO (in use for TeleText trials)  
**TR19/** American Movie Network  
 TR20/ not taken  
 TR21/ RCA (reserved, not in use)  
 TR22/ ABC (reserved, not in use)  
**TR23/** not taken  
 TR24/ NBC (now in occasional use, day and nighttime)

ON F4, transponders 3, 7, 11, 15, 19 and 23 are designated as 'high power' (8.5 watts) by RCA; identical to the 'high power' transponders found on F3R. On F2, transponders 3, 7, 11, 19 and 23 have a special 'Alaskan boresight' which greatly reduces the signal levels on these channels within the continental US (CONUS), especially as the receiving site is moved further and further from Alaska proper.

RCA WILL be shifting virtually all of its Alaskan traffic over to F5 at 143 west during this month (January) and the channels now found on F2 and F1 will move to their new F5 home. 18 of the 24 F5 transponders have a special Alaskan boresight pattern, and they will probably not be usable within CONUS much further southeast than the Pacific northwestern states.

#### COOP'S COMMENT / Continued from page 3

Every month those buying this service will be given a long list of current musical selections and they will fill out a form 'ordering' certain musical numbers. The system will transmit the selections into the homes. The system will also provide a tone activated code which will come through the system just ahead of each musical number transmitted. If you ordered the latest Loretta Lynn tune, just ahead of their transmitting that record the tone/data burst transmitted would turn on your cassette tape recorder and then when the record was transmitted, your tape deck would record it. This will happen 'unattended' and by the time the month is over you will have a neat, little 'row', on tape, of each of the musical numbers you ordered.

The concept here is that while millions of people now routinely tape music from AM and FM radio, it requires a devoted person's fulltime attention to sit there and hit the record button each time a desirable number is played. In effect, you will get on your-tape, automatically, just the numbers you ordered, each month. A payment scheme has not been released, but it is worth noting that the fee you pay will include a 'copyright royalty fee' that will go to the artist. That has been one of the bad problems with record sales in the past few years; the proliferation of home cassette recorders has cut the top off the sale of LPs and other records. The new Panasonic (et al) service won't stop

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home cassette taping from the local Top 40 station, but it will offer an attractive alternative to many people who don't have the time to sit there pushing on a cassette button all month.

And the key, of course, is that the system is addressable, and individual service subscribers will not only have their own identification code, but an 'address within an address' that switches on their recording equipment to coincide with the music they have ordered that month.

Addressable technology is very young at this point. The rapid development of digital electronics is making it happen with blinding speed however and during the next two to three years the use of addressable systems will proliferate rapidly. Some of this is bound to rub off on satellite television services. And it should serve to remind us all that the type of satellite television service we enjoy today is anything but a static, mature technology. Change, more than anything else, will continue to be the dominant characteristic of satellite communications for another decade or more.

#### THINGS YOU LEARN . . .

Immediately following the Provo Satellite Retreat Tom Humphries packed up a 13 foot antenna and all of the associated parts and we chartered a D18 plane over to South Caicos. Tom and our helper Val were scheduled to put in a private terminal for one of the government leaders in the Turks and Caicos. I rode alone as far as South Caicos, helped them off load their 500 pounds of cargo and then I flew on to Grand Turk to spend a day working with some government officials on a pet development project we have going here.

When I checked back into the Grand Turk airport around 4 PM to pick up my ride back to Provo, there was Humphries waiting for me on the telephone at the ATC office. "We are missing two antenna mount supports and the feed" he reported. I groaned and promised to get the parts down to the early morning Turks and Caicos National Airline plane the following morning. "I want to go ahead with the barefaced LNA" he added "to see if we can get the tracking correct anyhow." It is true that even without a feed on an LNA, you

can detect and even watch some of the stronger signals; a feed is not an absolute requirement for basic satellite reception.

Two hours later I was sitting in the WIV control room running the evening commercials and nursing a red colored drink that Max Robinson also enjoys, on ABC. The telephone rang. It was Chuck Tepfer at **Videoplay Magazine** complaining first that he had spent two weeks trying to get through to me. "I have gotten to know this family in Brooklyn intimately because everytime I follow the direct dial instructions my telephone connects me to this family" he reported. Then the connection came apart and my phone went into wild noises.

I sipped on my drink and ran a commercial for the Bar B H Saloon. They were holding a 'Punk Rock Party' one night soon and the commercial noted that the lady who runs the place "will autograph your rock, anyplace you wish, in any color you wish." Only in the Turks and Caicos. The telephone buzzed again.

"Welcome Back" I said instinctively. I calculated that Chuck

Tepfer had been gone long enough to reach his operator again, and be calling back. "Bob, this is Larry James. Who did you think it was?" I suggested he compress everything important into the next 25 seconds since it was obvious this was one of those short telephone call cycle nights. Larry told me they had placed a DX receiver block down converter on (or in, the circuit was noisy!) a stove, gone to lunch, and then come back and found it too hot to touch. "Then we shoved it into the freezer and left it there long enough that we couldn't touch the bare metal" he added. And then they (the 'they' part being he and Peter Sutro) took it outside, installed it on a 10 foot Harris dish and then raced back inside to check the error rate on the Reuters transponder 18 high speed data feed. "The error rate was exactly the same after this hot and cold shock test as it was before we started the tests" he proudly reported. And the telephone went dead, just as Peter came on the phone.

I sipped on my 'Max Robinson Special,' again, and dropped a commercial for reduced air fares into the states over Christmas on the folks at home. As the commercial ran I remembered a fellow that hitched a ride on our chartered plane that day into Grand Turk. He had been trying to make an important telephone call out of here, to London, for three days. In desperation he had flown the 70 miles to Grand Turk, and back, so he could use the telephone in the local Cable and Wireless office on Grand Turk. The local telephone company could reach London at will from their office, a 4,500 mile jaunt, but the last 70 miles to Provo worked about ten percent of the time. My telephone buzzed again. Chuck Tepfer was back. Instinctively I answered "Brooklyn!". By now Chuck knew he had 30 seconds to convey his message. We settled on the theme for the next column I would do for **Videoplay Magazine** and as I watched the studio clock tick off the seconds I shouted "Good Bye Chuck" just as the telephone circuit quit.

While the next commercial was telling people to come to a grand RE-opening of a local boutique and sip on the free champagne being offered, the instrument gasped another feeble ring. It was Humphries. I was betting on Larry James and Peter Sutro since they had been gone long enough now to get their operator back on our call.

"Better send an extra LNA in the care package tomorrow" Tom reported. The LNA he had carefully packed for the South Caicos installation had been sitting on a dish for several weeks working just fine. I asked him what happened to it.

"It is probably working OK, but I can't be sure. It wants to oscillate or go into some form of unstable mode" he answered. I suggested that since it was a Dexcel LNA, and they use a different ferrite approach to matching than most of their competition, it might simply be that without a feed bolted on the front of the LNA the amplifier was 'unloaded.'

"Not having a feed handy doesn't give me the opportunity to verify that" he agreed. He did recall seeing some LNAs in his past travels which would produce a gray screen, without the usual noise or sparkles dancing around, until you bolted on the horn. I suggested he place his bare hand over the mouth of the bare LNA to see if the gray, smooth screen went away and the normal sparkle noise came back. "That will be an indication that the missing feed is the cause of the oscillation" I remarked. And then the circuit quit. Well, that at least pinned down the region for the local telephone firm's problems. South Caicos is 50 miles away, and on the circuit from Grand Turk to Provo. Since our local circuits work just fine, but the first non-local circuit stop (South Caicos) was just as erratic as the longer distance stateside calls, one quickly would deduce that the problems were between Provo and South Caicos.

I have had my share of grief with the local telephone folks. It all started when we wanted a telephone at the WIV Grace Bay facility. We are more than a mile from the last telephone line so they had insisted that we take a radio telephone. There is a 1000% premium for radio telephones; \$350 a month for the basic service versus \$35 for the landline service. The cost premium aside, the erratic nature of the service is a constant hassle. When you have no telephone, you find ways to communicate. Ways other than the telephone. On the other hand, when you have a telephone instrument on the premises, you neglect establishing backup communication systems and then find yourself with a severe problem when the telephone is erratic in performance. The bottom line is pretty obvious; an intermittent telephone

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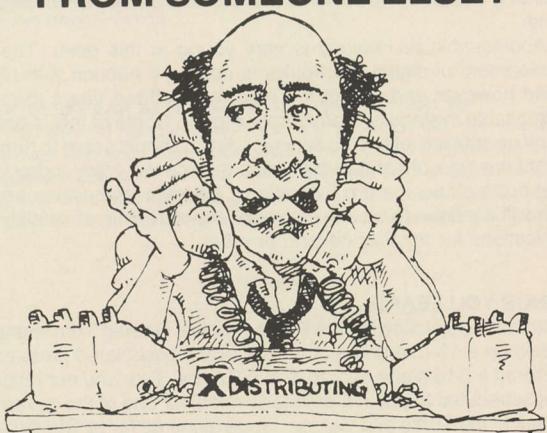
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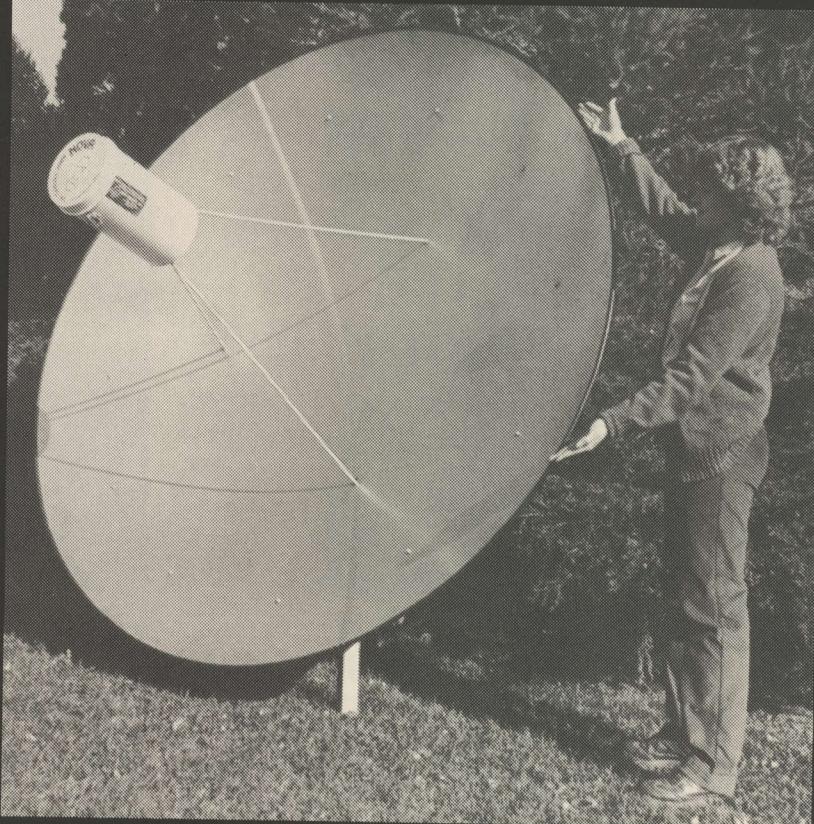
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is in many ways more of a handicap than no telephone at all.

Oh yes, Humphries found that the LNA he had worked just fine when he got a feed attached to it. But he couldn't tell me about this until he returned a day later. The telephone refused totally to work the next day and Tom, like the gent who rode with me to Grand Turk earlier in the week, found the best way to get a message across down here was to travel to the point where the message could be delivered.

#### WHEN I Screw Up . . .

The December report on the Atlanta show had a number of photographs and some copy concerning some 8 foot antennas. On the bottom right hand corner of page 17, we ran a photograph of an 8 foot dish. We blew it. And I know better too. The photo should have carried a caption as follows:

**JOHN KAUL** of Kaultronics with his 8 foot pressed-metal dish which delivered exceptionally good pictures for the small aper-

ture size.



The photograph (re-shown here) was correct; the caption was not. And as John quickly notified me, the company credited with the product in the photo is a 'neighbor' of John's and they are very competitive. I couldn't have gotten two worse photo/captions mixed up; unless it had been a photo of Taylor Howard and a caption for someone at Boman!

Sorry John. But at least we didn't go so far as ORBIT did for December and award a 'best booth of show' achievement to Interstar when the company they were really writing about was Intersat!

#### THE HUMAN SIDE

I have been very fortunate to have a number of old, good friends, and an even larger number of new friends, visit us here in the Turks and Caicos during this past fall. When Andy Hatfield (and Pat) and Jamie Gowen (and Linda) were here during early November, neither had any way of knowing that a selection had already been made in my mind for the '**Industry Man Of The Year**' award. In fact neither have any advance warning of their joint selection and they, like you, are reading it in this issue for the **first** time.

I must confess a weakness for the 'human side' of this industry. I vividly remember my first (telephone) contact with Andy Hatfield and his interest in satellite communications. As I write this, the latest Provo Flying Service freight plane has just landed and Tom Humphries has just returned from the airport with an AVCOM 66T package shipped down by Andy. Between that first telephone communication and the arrival of the latest Hatfield innovation, Andy and I have spent perhaps a total of ten hours **really together**. And most of those hours have been accumulated over dinner during industry shows, or during his recent visit to the islands.

Most of you know Andy from his immaculate attire and his soft, resonant voice at shows. Getting closer to Andy, than that, is no easy trick. Anyone that deliberately tries to do so is apt to find himself talking to someone else; Andy will have gone on his way.

Andy and I stood on top of Provo's highest hill one day in early November and I pointed out the perimeter of the island below. Nearby, the WIV 'mountain top' transmitter site was grinding out its ten watts of power to send television to the folks scattered below.

"I think I could live up here" Andy quietly remarked. Knowing that Andy has held an amateur radio license for many years, and knowing that all hams have this fetish for living on the highest hill or mountain top around, I responded "**It would be an excellent location for hamming.**"

Andy shook his head. "**No, I am not very active** (as a ham) **anymore. It is just that from up here, a person could be on top of everything.**

That, plus our cover photo this month, is the **real** Andy Hatfield. A man who pretty much keeps to himself, who selects each word and sentence with great care, and who often asks questions but seldom offers advice. Andy's mind, I feel, is well trained as a computer memory bank. He collects data, grades it for importance, shuffles it into the proper retention stream and logs it away. I wouldn't be

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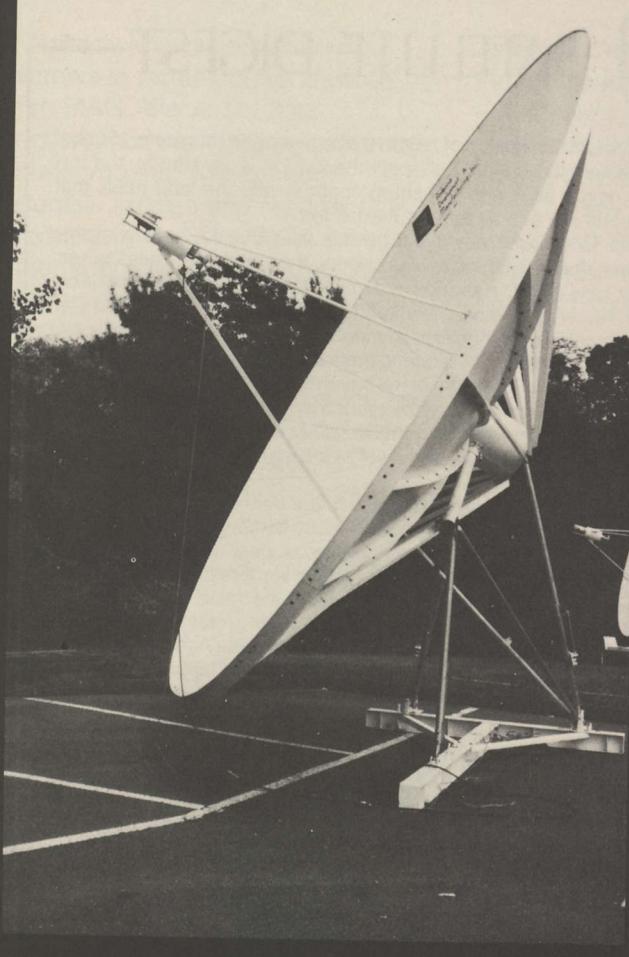
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surprised to see him come back down to Provo one day and find his way to the top of our 'transmitter mountain.'

Barely two weeks later I found myself standing on top of the same mountain with Dave McClaskey of Intersat. Dave was in the 'crowd' that came down for the Retreat. Dave is not the type to stay in a crowd very long. He differs from Andy Hatfield by at least 280 degrees.

"I want to bring Sue up here to see this view; I have never seen anything like this in all my life," he panted. We rode up from the bottom in our Blazer so I knew he wasn't panting from the climb. I attributed it to his excitement.

It is amazing what a mere 150 feet or so can do to your perspective. Our island is flat, but not as flat as some islands. When you stand on our transmitter hill and look around, you immediately have to remind yourself you are but 150 feet above the sea level surrounding you on all sides. I have spent tens (perhaps hundreds) of hours, in my youth, working on towers that were two or three or four times as high above the surrounding terrain as this 'small' hill. Even from 800 feet, I

cannot recall the illusion of height that comes with this mere 150 foot bump above the ocean. I suspect the illusion is created by the turquoise ocean itself and the sharp contrast with the land mass that rushes into the sea all around the hill top.

Dave McClaskey never did get his wife Sue to the top of the mountain; she was far too busy exploring the wonders **under** the sea with her 'new friend,' a snorkel and mask. McClaskey **did come back** there however, and with a portable VCR package shoot videotape that he will probably roll for dozens of friends through the winter on his big screen TV back in St. Louis boring them all to death with his adventure in the Caribbean. That's one of the hazards of home movies; no matter how well executed they may be, your friends approach sitting down and watching them with you with a negative attitude to begin with. It is difficult to transfer the excitement of being someplace to any screen I have ever seen.

Dave McClaskey and Andy Hatfield are both leaders in our industry. I am more fortunate than most because I know them both as close friends. I am also more fortunate than most because I have had the opportunity to watch them both when they were being as 'natural' as people ever become; away from a show, the false glamour of the exhibit hall, and the constant edge people have to retain when they are 'on display' before the public. Dave McClaskey, like Andy Hatfield, will one day return to this 150 foot 'mountain top' in the Caribbean. And the mountain top will be better because each has passed its way.

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### THE EVIDENCE MOUNTS

Many of you may not recall the hectic days of the satellite industry that passed by along about 1978 and 1979. Those were the transponder crunch or shortage years; a period of time when there were at least two would-be transponder renters or leasers for each available transponder. All (two) of the Western Union birds were 12 channel capacity. And these 12 channel WESTAR satellites had no cable TV type programming on them. In fact, other than PBS, you found very little video up there on a **regular** basis.

The cable industry was moving from its original F2 home to F1 along about this time, a move that was required when the available F2 transponders were filled up by cable programming firms. The F2 bird, then and now, had 6 of its 24 original transponders dedicated to a special Alaskan boresight beam pattern, and that meant that at the very most only 18 cable programmers could be accommodated on the bird (the Alaskan set of six being unsuitable for coast to coast domestic CONUS coverage). Those 18 quickly became 16 when you withdrew the two failing or failed transponders (4 and 13) and that number then became 14 when RCA pointed that that in the very best case they **had to** retain **two** of the available CONUS transponders for coast to coast narrow band traffic. The move to F1, from F2, was made to open up the full operating capacity of a bird (23 operating out of 24 initial) to the cable television industry. It took very little time for the 23 available transponders to be grabbed up by cable programming firms.

There followed, then, a period through December of 1981 wherein additional cable growth occurred in bits and pieces; a few cable services on Westar 3, then a few more on COMSTAR D1/2 (which was pressed into cable service as an interim measure to fill in for the loss of F3, which failed to make geostationary orbit in December of 1979). The cable industry probably didn't **suffer** by being forced to wait for the launch of F3R, and the subsequent assignment of cable services to F4, W4 and recently W5; but it thought it was going to suffer, or was suffering, nonetheless.

**Now we note with some irony** the rush by Europeans to get onto the first of the ECS birds. ECS-1, a 12 GHz bird, is scheduled to go up via Ariane this coming April. It will offer **9 television transponders** to European video programmers. Unfortunately, there were nearly **30 applicants** for those 9 transponders by the middle of this past November.

ECS-1 is a European bird. Only two have scheduled launch dates but there is a contract to purchase up to 5 such satellites. If all five were to be launched in a short enough time that the service period of number five occurred while ECS-1 was still operational, there would be nearly 50 potential video transponders available.

That approximately 30 of those 50 potential transponders may

CONTINUED / page 84

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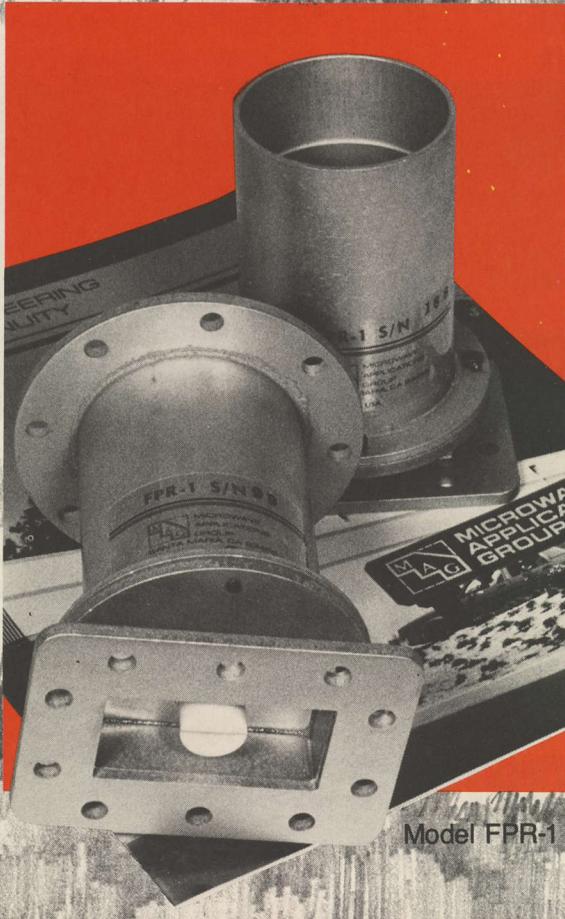
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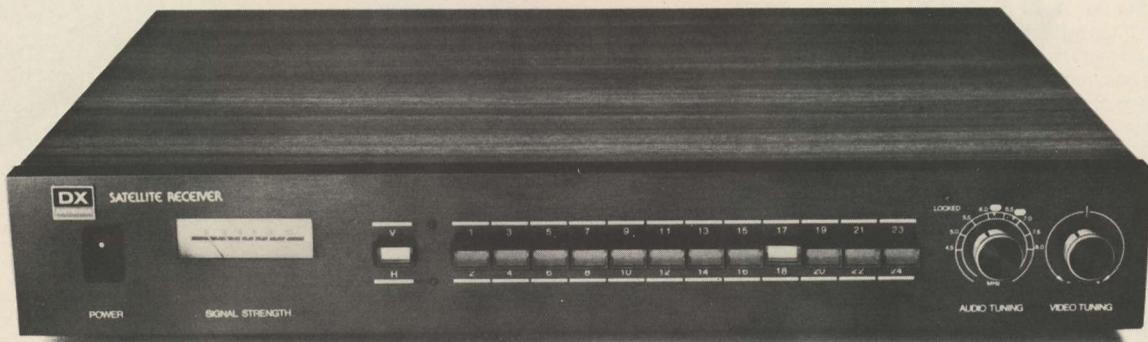
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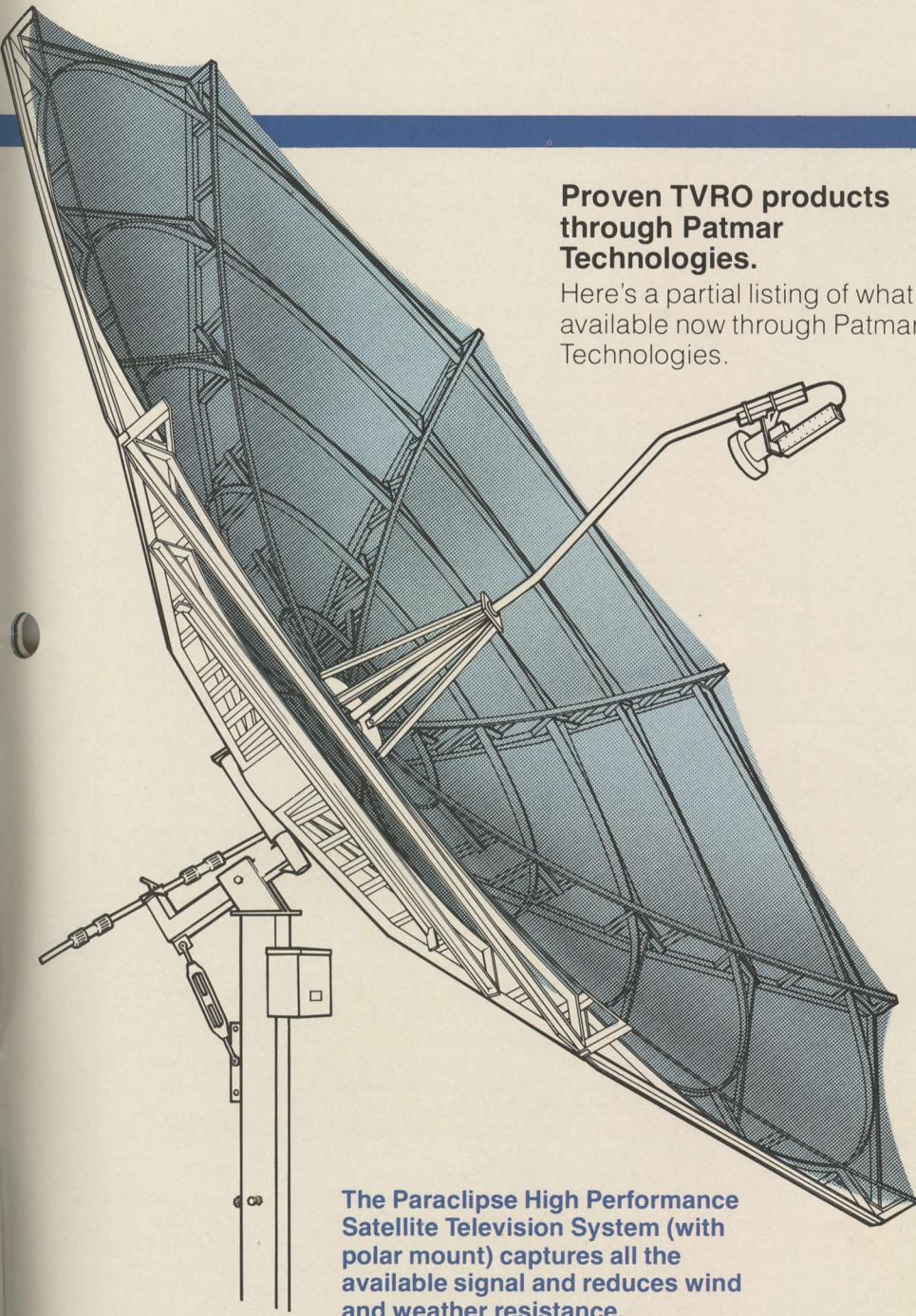
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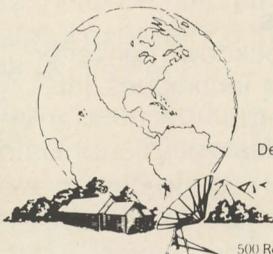
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already be spoken for, at a point in time that would roughly parallel the 1977 era of American domestic satellites (when only CBN, WTCG/WTBS and HBO were operational), is causing some very nervous excitement on the continent. Steve Birkill addresses one possible way out of this problem in this issue of **CSD**. Basically, what Steve tells us is that European firms may opt for the same type of decision which saw Americans press parts of Westar 3 and COMSTAR D1/2 into video service as an 'interim first step' to fill the gap until sufficient video transponders are available to handle the would be users.

**One of the things which won't work** is for an American programming firm to go directly to Eutelsat and ask to rent or lease a transponder. Under Eutelsat rules, only those member "nations" of Eutelsat can use their transponders. EU stands for Europe and inspite of our massive presence on the continent, the USA (or Canada) is not a member of the Eutelsat governing board. That comes pretty close to home when you realize that as badly as Ted Turner may wish to send WTBS/CNN/CNN2 into Europe, he cannot deal **directly with** Eutelsat for use of a transponder on ECS-1. Or ECS-2, and so on.

So how might Mr. Turner get his US cable network programming into the European marketplace? There is no easy answer, as he is fast learning.

The geostationary orbit arc segment that appeals primarily to the Europeans is between 35 west and (east to) 15 east. Birkill discusses why in this issue of **CSD**. By the same token, the portion of the same arc which most appeals to North American satellite-casters is located between approximately 75 west and 140 west. This leaves a 'hole' between 35 west and 75 west which excites many people.

On the surface, this 'hole' is no hole at all. At 4 GHz, it will be perhaps largely filled with domestic birds dedicated (one day) to the South American countries. We already have an Intelsat bird, in use for Mexico, living at 53 west. But at 12 GHz, a frequency band which I suspect will not be attractive to most of the South American countries until well into the 1990's, this hole offers some very interesting possibilities. Again, Birkill deals with this lightly in this issue. What **could** happen here is that a bird located within portions of this arc segment could provide single, direct, **one hop service** between the eastern USA and say all of western Europe. An uplink in Atlanta, for example, could go directly into European cable headends (at 12 GHz). There is only one present hitch, of course. Nobody has a bird ready to go, at 12 GHz, for anyplace in that segment of the orbit belt. And Turner, if we can believe his oft repeated remarks, is ready to go in 1983.

The transponder 'crunch,' or shortage, is going to play the same kind of havoc on the development of European cable delivery systems as it played on the development of the US cable development five to six years ago. Only to complicate matters, there is the extra element of 'nationalism' involved and the uneasy arrangements that have been promulgated to get Eutelsat off the ground.

One of the proposals calls for the first 9 available transponders to be let out or awarded on the basis of paid-in-investment in Eutelsat by the member nations. That would create an 'after market' of a sort since of those initial paid in partners perhaps only tiny Luxembourg has a shot at a transponder which no national-Luxembourg firm would be likely to use. Don't be surprised to see some US firm set up an incorporated affiliate in Luxembourg!

**There are so many players in this game** that no real projections can be drawn. CBS, for example, is known to be studying the creation of a European feed. RCA (not NBC) has already asked the FCC for permission to move into direct uplinking from an RCA facility to an Intelsat facility. If RCA Globecom clears that hurdle at the Commission, they are well past the half way point to shifting an RCA 4 or 12 GHz bird into that 'window' between 35 and 75 west. Their Globecom subsidiary is already into international communications. An RCA bird could therefore possibly become the first **privately owned** international bird.

Intelsat is probably incapable of **stopping** any of this; but they **will fight** it tooth and toenail for as long as they can delay it happening. But even mounting a delaying action has its dangers since at some point they could be faced with a mass exodus from Intelsat by aggrieved member nations; especially in Europe.

All of this of course points to 12 GHz, and not our present 4 GHz

CONTINUED / page 88

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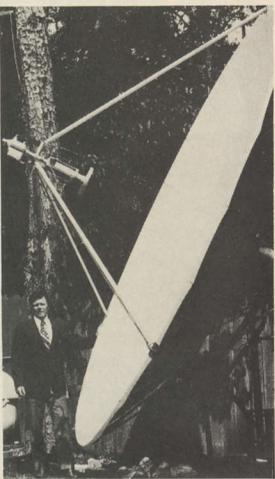
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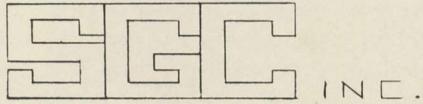


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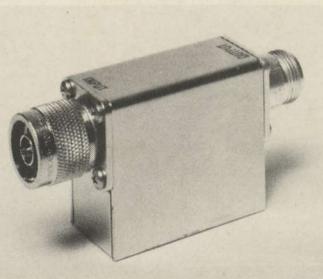


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service band. The posture of 4 GHz during this period of readjustment is unclear until we know how some of the major players in the game will consider their **temporary** options. The best bet to get into Europe on a temporary basis is still 4 GHz where even for European feeds there is a surplus of transponder circuits.

If there was a 12 GHz capable bird operating today in the European-North American window (i.e. 35 to 55 west), Ted Turner would already have a transponder locked up on it. There is no such bird, and so Turner and CBS and others who may have direct US to Europe feeds for cable in mind are having to scramble to find some way to get there, from here. It is not an easy question to resolve and perhaps there will be no resolution until well into the latter ECS series of birds. In the meantime, the players in all of this are investigating every option they can conceive.

**It would not surprise me** to have confirmation that Turner's people have been talking with the Russians about taking over transponder 9 on Ghorizont at 14 west. Afterall, with a little doctoring on the next G(h)orizont to go into that position, WTBS could be uplinked from Atlanta through G(h)orizont to Moscow where it would be re-uplinked into one of the two 42 dBw European spotbeams that all of the G(h)orizont birds to date have had on board. And as our front cover depicted last month, an under 3 meter Russian terminal is in use in hundreds of Russian operated terrestrial locations receiving these 42 dBw (nominal) G(h)orizont signals in eastern Europe. **The same system could also be employed for cable systems in western Europe.**

Alas, that is a pretty far out concept and the chance of it flying is somewhere between poor and forget-it. Nonetheless, the next two years will be crucial in Europe since it will be during this period of time that the 'foundation' for cable delivered programming throughout Europe will be set in concrete. Anyone who misses these early years is going to find themselves in pretty much the same situation as the 'Johnny-Come-Latelys' in North America who somehow didn't get onto F3R. ECS-1 will not be the **only** European cable bird to fly; but it will be **the first** and that will give it the same marketing advantage as F3R today enjoys. The developments of the next six to twelve months will be crucial to all of the players involved. And some will not be above 'desperation decisions' in the coming battles to get their piece of the European sky.

### NUMBERS

There has been an unhealthy interest, some say, in industry 'numbers' for quite some time. The industry was barely one year young when the first proposal for 'monitoring' the growth of home terminals surfaced.

Sporadically, since that time, our trade association (SPACE) has floated efforts to get manufacturers to contribute data to an equipment-shipped-'data bank.' SPACE feels that there is value to knowing with some degree of accuracy just how many home terminals are really out there, how many new ones are being shipped from manufacturing plants each month, and how many are 'lodged' in the pipeline within the industry.

The professional terminal folks belittle our efforts and some of us take offense when **Satellite Week** or some other high priced newsletter makes fun or pokes pins in our industry statistics. I can't blame them for being uncomfortable with the numbers they quote in print; I am just as uncomfortable as they are when I see someone claim that the industry shipped an average of 4,000 terminals per month in 1982.

A year or so ago it was possible to talk confidentially with suppliers and learn what they claimed their annualized shipments amounted to. I did that just a year ago and then boldly derived some numbers for the 1981 year. I also forecast what the growth might look like in 1982, based upon two unknown parameters: the growth of LNC packages, and what had been (in January of 1982) an anticipated shortage of LNAs. It would turn out that as 1982 cranked along that LNCs would not rise to dominate receiver packages, nor would LNAs become short in supply during the year. Therefore both parameters were at best incapable of effecting the 1982 sales curve.

Back in January of 1982, page T3 of **CSD**, I suggested that we were leaving 1981 with a monthly terminal industry shipping volume of 2,400 (terminals) per month. Had we stacked up 12 December 1981's in a row, that would have amounted to 28,800 terminals shipped

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during a 12 month period. Of course no two months are identical, and even 'smoothing' the numbers for seasonal drops and spurts (drops occur in the winter, spurts in the late summer and fall) resulted in a series of forecasts for 1982. The most optimistic suggested that by December of 1982, the industry would be shipping around 6400 complete terminals per month. The most conservative estimate suggested that the industry would be shipping around 5,400 terminals (in December of 1982). An erratic curve, taking into account the then-expected mid-82 shortage of LNAs, had us leaving 1982 with a monthly shipment rate of around 5,000 complete terminals.

Now who benefits from numbers such as this? Certainly any company management person charged with the responsibility of telling his Board of Directors just how much growth the industry was experiencing, and how to plan for future growth, needs to know this type of data. A distributor or dealer, attempting to arrange long or short term credit lines at his bank needs to know what the volume for his own accounts receivable, and payable, may grow to within a year's time since he doesn't want to awake one day and find out he is out of borrowing power or that he has no 'leverage' left.

Unfortunately, there are evils to collecting data; even accurate data. Maybe, especially, accurate data.

It is no secret that 1983 will be the year for scrambling. Those who would scramble, but not offer their scrambled services to home TVRO viewers, would love to know exactly how many terminals there are in place, how many more are going in place every month, and where the cash crunches may be in this industry. No matter what the numbers might be, we would hear them read into the Congressional Record, see them typed into massive FCC filings, and bantered about in the cable and broadcasting trade press. And in any of these forums, these are dangerous numbers indeed.

At the November STTI show in Atlanta, a number of us participated in a panel discussion concerning off shore reception. In particular, we focused on the extraordinary service possible all across the Caribbean now with dishes in the 10 foot to 12 foot class. In the audience were several members of the press. One rather lengthy report, appearing in one of those high priced newsletters, quoted both in and out of context everyone on the panel. The bottom line was that US satellite system sellers were invading the Caribbean by the busload selling terminals right and left. The truth is that there may be no more than 400 to 500 private (home) terminals in the Caribbean at this time.

Our comments, made in an industry forum, to fellow members of our industry, are already coming back to haunt us. Our effort to alert potential sellers of private systems to a market 'opportunity' in the middle and eastern Caribbean is causing us some problems. You can be sure that the particular newsletter story in point has been Xeroxed and distributed to hundreds of movie licensing firms, theater chain operators and others from Ecuador to the lesser Antilles. Home terminals are perceived as a threat, to businesses and governments, in an area of the world where under the table dollars can block almost anything from happening for months and years at a time.

Proof of this is evident in Ecuador where one of the attendees at Atlanta attempted in November to have a 6 meter terminal shipped to him there. The terminal left Miami on schedule, but at this writing it is firmly lodged in the hands of the Ecuadorian Customs people. It is caught there because COMSAT has hired a powerful attorney in Ecuador to block the importation of 'satellite television terminals' into the nation. Think or say what you will about South American democracies; the truth is that in many cases the only thing democratic about the regimes in power is the lip service they give.

Last year, 1982, we enjoyed seeing just how far and wide word could be spread about our unique 'service.' To quote an old line cable entrepreneur, Bill Daniels, "Nobody loves us but the people." Bill used to decry attacks on cable, from broadcasters, by repeating that remark to emphasize that the strength of cable lay in the support which the viewers gave to the service. It apparently worked since cable not only sustained broadcaster attacks but survived as potentially a far larger industry than broadcasting itself.

SPACE attorney Rick Brown recently wrote that "We would be wise to watch what we say about the growth of our service, especially where there are international treaties and 'foreign' nations involved with whom we may have very little persuasive power." I often disagree with Brown, but I believe he is right on this

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one.

We all know, now, that US domestic satellites do indeed 'spill over' into other regions of the western hemisphere. In **CSD**, where technical reports of satellite performance can be written in such a matter as to be comprehensible to industry people but largely gibberish to non-technical or non-industry people, they serve an important function. Showing up on the front page of the **Chicago Herald Tribune** or the **Caracas Bugle** announcing that American TV is about to 'invade' South America is not only unwise, it is plain stupid.

Into the same mix falls any publicized, accurate analysis of just **how many** receivers we are producing or how many home terminals we expect to see sold in 1983. We don't need, and don't want, those numbers being read into official government documents. When the right time and place comes, then and only then should we make our true strength known. If HBO is going to mount a new offensive in Congress against us in 1983 (and surely they will), let them do **their own** homework as to our size and growth. Why arm the 'enemy' with ammunition from your own supply train?

While the excellent group met in Provo in mid-November at the Satellite Retreat, this topic got plenty of discussion. It was the consensus of the group, to a man as I recall, that we as an industry **forget about numbers**, claims of our growth, and industry hype. I am in accord. If somebody out there wants to conduct a market survey, let them do it on their own nickel without help from the people who can only lose if the true growth figures are generally known. So much for numbers.

### FIGHTING THE INTERNATIONAL BATTLES

I am plainly worried about the recent development in Ecuador; the guy who has a 20 foot terminal stuck in the local custom's inner sanctum. This is not the first such report I have heard; although it is the first for Ecuador. You may recall from the December **CSD** that a chap hauled a 'broken' (he didn't know it was 'broken' at the time) 20 foot fiberglass antenna to Ecuador for tests. What he found with the first 20 footer was that there were US and Canadian signals present. What nobody knows today is how much gain the broken antenna really has; and that suggested that a proper, 'unbroken' 20 footer be hauled in for more tests. That's when the long arm of COMSAT/Intelsat stuck out and grabbed the inward bound antenna. I haven't seen the written paperwork describing the snafu yet but I suspect that the Intelsat attorney is pointing out Ecuador's Intelsat membership, that all Intelsat signatory nations agree to enforce the regulations of Intelsat, and that further there are no Ecuadorian **domestic** bird or domestic transmissions available which an **unauthorized** terminal operator can tune in. I further suspect that the attorney representing Intelsat in Ecuador is warning the Ecuadorian regime about allowing 'nasty American' television into their country.

You may also recall from the December **CSD** that a fellow in Colombia is fighting a battle in that country to get government permission to allow the reception and then rebroadcast of stateside signals via low power TV transmitters in Colombia. I have subsequently learned that the Colombian government **does allow** VHF and UHF 'translators' to operate in the country, **without** a license or government permission; **provided** they are merely rebroadcasting programs from one of the Colombian national networks. So it was not the **transmitter** that caused the government to react; it was the **programming** on that transmitter. It is important to keep the two separate since in some countries the mere possession of an unlicensed transmitter is a serious offense.

A chap recently back from Havana tells me about a new UHF station in Cuba; Havana to be exact. It would appear that a 100 watt UHF station is transmitting **GalaVision** in Havana, off of the satellite. We all are aware that Fidel Castro has several private TVROs and that he is a fan of CNN, among other things. Apparently there are those in the next level down from Fidel who have managed to get sanction for a 'sharing' of the **GalaVision** Spanish language service, delivered via a relatively low power UHF transmitter, into their homes. I guess you could call this the Cuban version of MDS.

Another fellow detailed for me the problems he had getting private terminals into a Caribbean country. He wanted to sell terminals, felt that there was a market for 50 to 75 such terminals in the \$10,000 price

# "I WAS SATELLITE WHEN SATELLITE WASN'T COOL"

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The interest in European satellite services has exploded. Major European Governments have given the go-ahead for their own domestic and pan-European DBS services to commence within the next twenty months. SATELLITE TELEVISION LTD are already on the air serving five European countries with nightly English language television programming and cable operators able to relay their signals are also offering some of the Russian satellite services.

A \$6 billion 32-channel cable expansion has been given the go-ahead by the British Government who have approved a report commissioned by a working party headed by Lord Hunt which has evaluated during the past 12 months the expansion of cable television. The massive requirements for technology, equipment, supplies and programming are imminent. SATELLITE TV NEWS keeps you in touch with the ever changing European market scene. SATELLITE TV NEWS puts you in touch with the people that matter within our satellite and cable television industry. Our publication is distributed throughout the United Kingdom and is on sale in all magazine and news-stand outlets and is available overseas on subscription. Seemail (delivery 4-6 weeks) send \$50 for twelve issues (add \$20 if an airmail subscription service is required) — or send \$6.00 for a sample issue.

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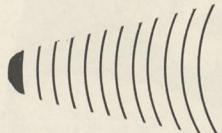
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range, and had three terminals shipped in. He spent several months trying to get them through customs. First of all, the local customs would not affix a custom **rate** for him since satellite antennas didn't appear in any of their official government category lists. He tried calling them solar collectors, umbrellas, and even 'lamp shades'(!), but to no avail. After several months he finally got an audience with the 'elected' leader of the country. There it was explained to him that the duty would be 900% of the stateside cost; and no fair supplying falsified stateside cost documents! That drove the retail price to far above \$30,000 which was a big double ouch. Our man was about to give up when an aide to the 'elected' leader discreetly **suggested** a compromise. If our man would generously offer to place a 'test' (as in gift) terminal in for the 'elected' head of state, and **two of his henchmen**, the import duty might be lowered to 50% of the stateside cost. My informant wasted no time getting the three initial terminals installed 'in the right places.' Now he is in business there, selling terminals for \$12,000 each.

I could go on but I am sure you see the scenarios forming. Individual countries are going to adopt individual local laws affecting terminals. They will adopt these laws because somebody in government has a monetary ax to grind. In simple terms, more often than not, they want to have their palms greased.

One excellent way to handle this is to go in ahead of time as a tourist and locate the best, most influential attorney in the country. Pay him to help you with the problems that are bound to come, and let him decide who gets what and how. The attorney will probably be 'on the take' too but at least he is working for you. If you **wait** to make such a contact until after you have your initial shipment of terminals tied up in the local custom's house, you have already lost the battle. At that point **they know they have you**, and the **best** you can hope for is losing all of the terminals en masse. Better to go in and lay the groundwork, 'gifting' a few people with terminals before you march in to sell terminals, then to put yourself in the awkward position of defending your importation of a 'forbidden commodity' after you have **already** broken 'the law.'

Merely checking to see if there is such a law is naive. **Of course there is no such law.** They make the laws in a split second, **right after** they figure out who you are and what you have in their customs warehouse!

All of this fun and games aside, there is clearly a need for a central clearing house which attempts to keep up with the various rules, regulations, and 'grease points' for each of the nations of the world. There is also a need for a coordinated exchange of technical and system installation data for those areas of the world where an 8 footer and \$399 receiver will not play. This is valuable, much needed information which anyone who seriously plans to move into any portion of the international market must have available before he steps off of an airplane.

This will, at this stage of the game, probably be very difficult information to collect and even more difficult to assimilate. Until we have had real world experience in far more countries than we have 'entered' to date, we will be guessing more often than not.

Dealing with different laws, regulations, rules, and 'pay off schemes' in each nation where terminals are likely to be sold is far more complex than dealing with the likes of Jack Valenti in the USA. Valenti is predictable, and we understand his deep Texas tones. We cannot predict how a custom agent will react in Kenya, nor will we understand what a Filipino custom agent says when he blocks entrance to his country for our twenty or fifteen foot antenna.

Many of the nations of the world will simply say '**no, you cannot bring that in here.**' We joke about France being self-centered and a touch socialist. At least there is a civilized history of law in France; there are probably more than 100 nations where law is made **on the spot** and changed only when the right, magic words and 'documents' are exchanged.

I feel an obligation to warn anyone planning to ship terminal equipment to any Third World nation, and some that are not in the Third World, to be exceedingly careful about how you represent a TVRO, The 'Gee Whiz — Ain't Technology Neat!' attitude that largely prevails in the states is hardly matched elsewhere. Our enthusiasm for the technical ability to tune in, at will, broadcasts from around the world in the comfort of our own living rooms will land you into the 'comfort' of a local prison in many parts of the world.

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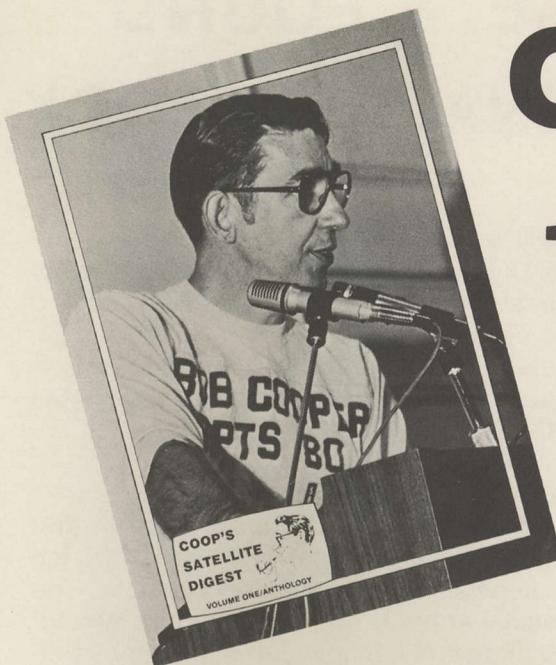
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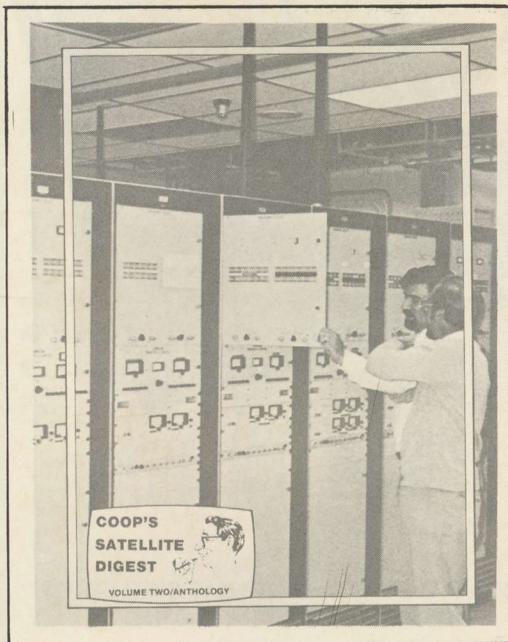
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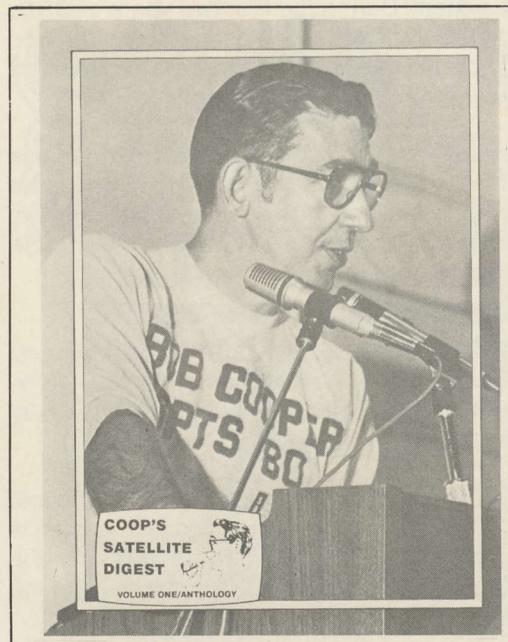


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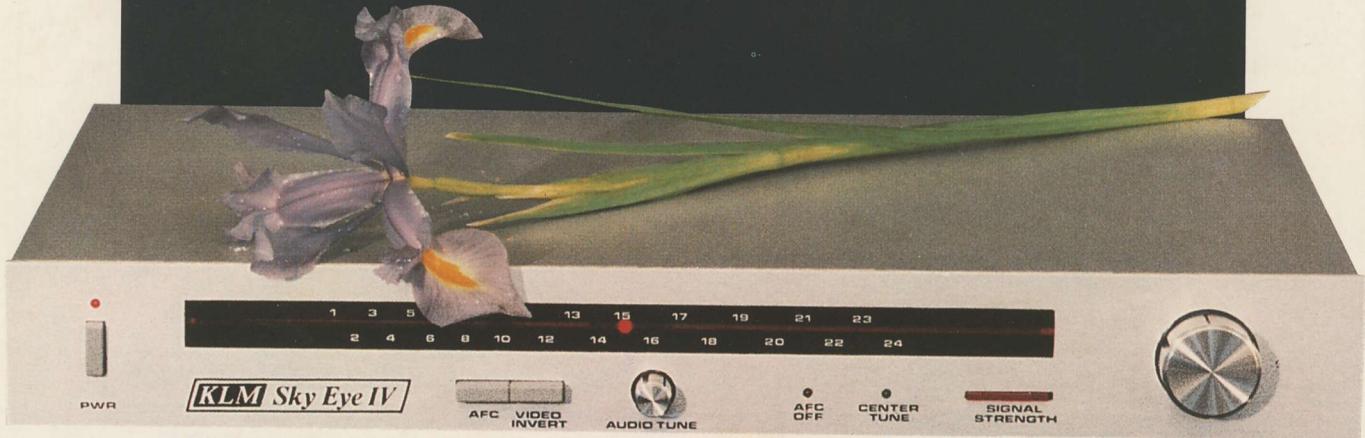
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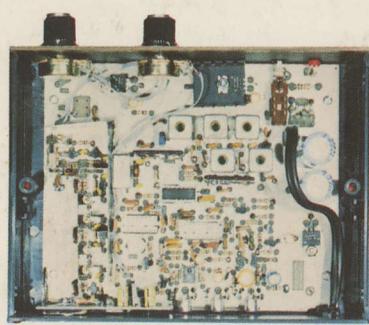
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